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Greetings for 1921.

Agriculture.

HARVESTING WHEAT, NEAR ALLORA, 1920.

The wheat harvest of 1920 promises to be a record for Queensalnd, and the subject of the illustration has been a familiar sight throughout the wheat belt during the past two months.

The machine (the Reaper-Thresher or Header here shown) is quickly taking the place of the Harvester and Stripper; its chief advantages being in its ability to get over more country and pick up lodged and tangled crops. The area photographed is one of the many that are returning heavy yields of wheat and barley, and is situated about 1½ mile from Allora, on the Hendon side. The noted Goomburra Valley lies to the right of picture.

The varieties in this vicinity:—Amby, Florence, Piastre, Coronation, Rudd's Early, Bunge, and Gluyas are representative of the bulk crops throughout, and their respective yields are within reach of 30 bushels per acre.

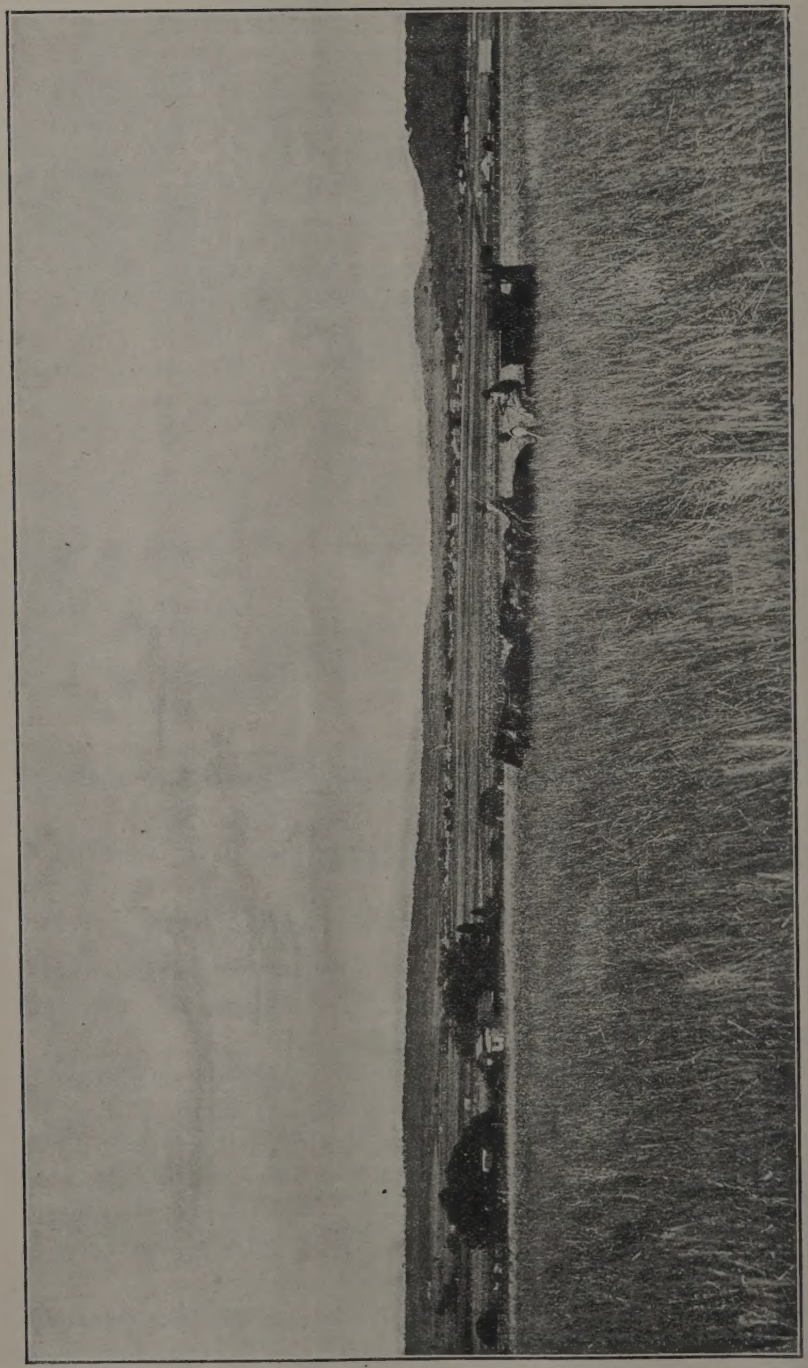

PLATE 1.—HARVESTING WHEAT NEAR ALLORA, 1920.

SMALL HOLDINGS AND MIXED FARMING.

We doubt if the opinion of a writer on this subject in "The Farm," a very excellent journal devoted to the farming and grazing industries in South Australia, will be accepted as gospel by the proprietors of agricultural homestead selections in any part of Queensland, with the exception of some of them who pin their faith on a sugar-cane crop. He states that—"Now that mixed farming has become the order of the day, and is being constantly drilled into the man on the land as the only hope of success, he is quite prepared to be called a "crank," or behind the times, when he calls into question the wisdom of mixed farming as applied more especially to small holdings. Many years, both of personal experience and wide observation, had forced him to the conclusion that in very many cases, mixed farming is simply a delusion." He quotes Mr. Carnegie, of library fame, who said, when asked what was the chief thing which leads to success: "Put all your eggs into one basket, and watch the basket." "This statement," he says, "puts his theory into a nutshell exactly."

"Now," he writes, "take the case of a man who has, say, up to 40 acres, a large portion of it being hilly country, and practically useless except for a little grazing. He is keeping two or three pigs, a couple of cows and horses, is growing fruit and vegetables, potatoes, strawberries, &c., and about one-half of his time is occupied in taking his stuff to the market; the other half is put in at really hard work in the garden, and it will be generally agreed that market gardening is about the limit as regards hard toil and long hours. His total average income only provides a bare living. Why? Because of the simple fact that he has more to attend to than he can possibly manage. Some work is always in arrears. He is working on vegetables when the pruning should be done; he is hoeing potatoes while the hoeing of strawberries is neglected; he is digging potatoes when the spray pump should be going; and while he is away at the market the whole machinery is stopped, and so it goes on throughout the year.

"Now, my contention is, that instead of having all these irons in the fire, were he to specialise and concentrate on one thing, it would not only considerably lessen his labour and worry, but would return a far larger income. For instance, he has been growing half an acre of potatoes. Four acres would return more than his present income with half the labour. He has kept two cows. A dozen would provide a fine income, and he could grow all their feed. I give these two items merely as an example, but the same good results would follow were he to specialise in any one of the many departments which at present are a source of worry and hard work, and which, all combined, fail to provide him with either leisure or a fair income.

"I would like the occupiers of small holdings to seriously think the matter out, and I feel confident that they would bless the day when they resolved to specialise."

To every question there are usually two sides, and there are certainly two sides to this dictum. Suppose that a farmer plants 4 acres of potatoes on his 40-acre selection, and no other crop. At the proper time they are hilled up. How is the grower going to fill in his time until his potatoes are ready to be dug? Or what source of income has he, when the potato crop has been ruined by blight or frost or market falls? There are many crops which do not demand any special attention after planting or sowing. Such are lucerne, sweet potatoes, sorghums, oats, maize, arrowroot, sugar-cane, cotton, cereals, and many market-garden crops, which make no great demand upon the farmer's labour. So with various fruits; the fruitgrower does not spend all his time in pruning and spraying his trees, and as for market gardening being "the limit as regards hard toil and long hours," we never found this to be the case when on our farm, even before the scrub land had been stumped. All our work on the crops was done with the hoe. The various crops were kept clean and were harvested in their proper season, and there was plenty of time to attend to the wants of a few pigs and fowls. It not unfrequently happens that unseasonable frosts destroy the young maize, that potatoes have succumbed to disease, that cereal crops are destroyed by rust, smut, heavy rains, caterpillars, &c., &c. In such cases, whence is the one-crop farmer to obtain the means of carrying on? His only hope of making both ends meet will have vanished with his loss. If he possess a few cows, pigs, and fowls he may make something out of them by buying food for them, but in drought time the cost of fodder would probably be prohibitive. The one-farm-one-crop theory will be found in practice to be unworkable and unprofitable. Mixed farming will pull the farmer through a bad season. Specialising is doubtless profitable in trade, in stockbreeding, in a manufacturing business, and in certain arts and sciences and inventions, but we would not apply it to farm crops.

ROMA STATE FARM.

WINTER CEREAL EXPERIMENTS, 1920.

METEOROLOGY.

In January and during the first week in February good rains were experienced. This brought about a growth of weeds which it was impossible to adequately deal

with; at the same time hot drying winds were a prominent feature in the meteorological conditions, consequently the benefits derived by the soil with relation to its moisture content was not nearly as great as might be expected. The balance of February was dry, likewise the months of March and April, precipitation being low, and hot, drying winds prevalent. These conditions undoubtedly curtailed very considerably the total area sown with wheat in the district, and at the same time resulted in a decrease in the May sowings, with a corresponding increase in the later ones. In May, 95 points of rain fell, but owing to the manner in which it fell, the very dry condition of the surface soil, and the absence of available moisture in the subsoil, it was of very little value, even on the light soils, whilst on the heavier soils it was injurious rather than beneficial, causing as it did the grain to start into growth, and die through lack of moisture to carry it on. It was not until the second week in June that rain to do any good was experienced; 263 points were then recorded. This, followed as it was by congenial conditions, wrought a great change in the immediate prospects of the winter cereal crop. July was mild and wet, resulting in exceptional growth being made, with a correspondingly heavy drain on the moisture reserves, which throughout the whole period were low. August came in like spring, and active growths were maintained for a period, but as the first three weeks were dry the available moisture was utilised, and by the middle of the month the crops began to suffer. About this time the atmospheric conditions became more humid, and rust, which had been present more or less throughout the plots, began to spread rapidly. Fortunately, towards the end of the month a cold snap was experienced, the thermometer on one occasion registering 31 degrees Fahrenheit in the screen. This retarded for a period the progress of the fungus. The frosts occasioned very little damage on the farm; but one or two growers had fields of early crops practically destroyed. The first two weeks in September were just ideal for the propagation of rust; in consequence, some of the more susceptible kinds of wheat became heavily infested, the red colouring due to its presence being noticeable at a great distance. In the latter part of the month a cool, dry change set in. A little damage was occasioned by the frost, but it was the salvation of the late wheat so far as rust was concerned. This dry spell extended into October and ultimately caused the mid-season sown crops, and those others which were rank, to ripen off prematurely. On the 13th rain commenced to fall, and of the twelve following days eight were wet. This caused a good deal of weathering in the early grain, but it was of very little benefit to the mid-season wheats, while improving the yield from the late sown areas considerably.

Harvesting operations, which commenced on the 12th October and finished in the latter part of November, were considerably hampered by damp weather, rain being recorded twenty times during that period, though on some occasions the falls were insufficient for record purposes. The atmosphere was so laden with moisture as to render garnering operations impossible.

The following is a tabulated list of the rainfall:—

Month.	Wet Days.	Highest Fall. Points.	Total. Points.
December	3	64	129
January	8	93	268
February	4	135	330
March	3	25	59
April	10	22	56
May	10	33	95
June	12	165	319
July	8	100	303
August	10	145	82
September	6	54	175
October	9	135	304
November	11	29	76
	94		2,196

MANURIAL EXPERIMENTS.

Area of blocks—¼-acre each.

Preparation of seed-bed necessitated one ploughing, one cultivation, and one harrowing.

Sown on 10th May; bulk of seed germinated on 20th May.

Crop harrowed on 24th June.

Few ears peeping on 20th August; bulk of crop out in head on 26th August.

Ripe, third week in October.

Harvested on 29th October.

Variety—Bunge No. 1.

Seed treated with copper carbonate to prevent smut (bunt).

No.	Manure.	Cost. £ s. d.	Yield per Acre. Bushels.	Remarks.
1	Shirley's Super (½-cwt. to acre)	0 5 0	24	Crop fairly tall, thin, not very flaggy, slightly rusty; fairly even in height; germination even; stood up well; grain weathered.
2	Shirley's Super (1 cwt. to acre)	0 10 0	23·8	As in the last block, the soil is a sandy loam. Crop was fairly tall, thin, not very flaggy; slightly rusty. Germination even; stood up well; crop slightly uneven. Grain weathered.
3	Shirley's Super (1 cwt. to acre). Top dressing not applied	0 10 0	26·8	Same remarks as applied to Nos. 1 and 2.
4	Unmanured (Control)	..	25·2	Crop uneven; not as tall as the manured block; thin; little flag; rust. Germination even; very little of this crop lodged; grain weathered.
5	Superphosphate (1 cwt. per acre)	0 9 6	28·9	Soil more loamy; germination uneven; crop uneven in height, flaggy in places, and rusty; stooled well; grain weathered.
6	Thomas's Phosphate (unprocurable) ..	..	28	Manured with superphosphate and seed drilled in at the rate of 1 bushel to the acre instead of ½-bushel. Crop thick; flaggy in places; straw finer than in other plots. Germination uneven; crop rusty. Grain weathered and pinched.
7	Stable manure	2 5 9	28	Crop very uneven; very flaggy; most affected by dry conditions; weathered badly; white tipped; rusty; germination fairly even; crop rusted. Grain pinched and weathered. Crop stooled very well, but was weedy. At one stage of its growth it was easily the best block in the section to look at and, if cut at the stage when most suitable for hay, would have been capable of producing the heaviest return (hay).
	Last application 1916	/		
	½-cwt. Superphosphate	0 5 0		
8	Superphosphate (½-cwt.). Top dressing not applied	0 4 9	31·3	Soil uneven; germination and height of crop uneven. Stooled well for the most part, flaggy, tall, rusty. Grain fairly even; weathered.

No.	Manure.	Cost.	Yield per Acre.	Remarks.
9	Sulphate of Potash (½-cwt.) .. .. .. Nitrate of Soda (½-cwt.) .. .. .. Superphosphate (½-cwt.)	0 8 0 0 6 9 0 4 9	29·3	Soil uneven, major portion a clayey loam, ranging from sandy loam to stiff clay. Germination and growth very uneven ; stooled well ; flaggy ; rusty ; fairly tall crop ; portion lodged.
10	Dried Blood (½-cwt.) .. .. Sulphate of Potash (½-cwt.) .. .. .. Super (1 cwt.)	0 4 6 0 8 0 0 9 6	26·3	Soil uneven, similar to that of Block 9. Remarks applied to the latter also apply to this block, the only difference being that a slightly larger percentage of the crop had lodged.
11	Control (unmanured)	..	23·1	This block contains the largest area of unkind soil, consequently the crop was more uneven than any of the other crops. Badly rusted in places.
12	Dried Blood (½-cwt.) .. .. Sulphate of Potash (½-cwt.) .. .. .. Thomas's Phosphate (1 cwt.)	0 4 6 0 8 0 0 5 6	30·2	Owing to the fact that it was impossible to obtain Basic slag, "super" was substituted, consequently Plots 10 and 12 have the same application of manure. The soil on the whole is better than in Blocks Nos. 10 and 11. Crop uneven, tall in places, lodged where soil was rich ; stooled well ; flaggy in places ; rusty ; grain weathered ; germination uneven.
13	Dried Blood (½-cwt.) .. .. Sulphate of Potash (½-cwt.) .. .. .. Superphosphate (1 cwt.) .. .. .. Top dressing not applied.	0 4 6 0 8 0 0 9 6	24·8	Owing to the top dressing not being applied this experiment is practically the same as Blocks 10 and 12. The difference in yield must be due to the difference in the soil, though it appears to be practically the same over both. Other remarks as applied to No. 12.

Pre-war prices have been quoted for Nitrate of Soda, Sulphate of Potash and Basic Slag.

From the results obtained this year it would be utterly impossible to gain any idea as to the value or otherwise of applying manures in connection with wheat culture, but a perusal of the following table, covering a period of nine years, shows that an increase in yield of 2·4 bushels per acre can be secured by applying 1 cwt. of Superphosphate per acre.

Block.	1910.	1911.	1912.	1913.	1914.	1916.	1918.	1919.	1920.	Block Total.	Average, 9 years.
1	17·2	26·8	20·6	25·6	20·5	29·5	17·2	5	24	186·4	20·7 +
2	18·8	28·6	22·6	26·9	23·5	29·2	19·1	7	23·8	199·5	22·1 +
3	20·2	28·3	23·6	27·6	24·2	29·8	21·4	7·3	26·8	209·2	23·2 +
4 Control	17·6	20·4	18·4	21·4	21·6	30·1	17·6	5·8	25·2	178·1	19·8 —
5	21·3	26·1	20·6	24·1	22·4	31·2	18·5	6·9	28·9	200	22·2
6	17·0	21·2	20·2	23·2	22·6	30·4	18·7	7·3	28·0	188·6	20·9 +
7	17·7	22·1	24·8	21·2	26·6	24·9	22·1	5·0	28·0	192·4	21·4 —
8	18·8	21·2	19·3	22·0	24·1	28·4	18·3	5·5	31·3	188·9	20·9 +
9	19·3	17·3	15·7	18·2	24·4	29·5	14·1	5·7	29·3	173·5	19·2 +
10	19·3	20·3	19·8	21·6	25·6	30·6	15·2	5·6	26·3	184·3	20·4 +
11 Control	18·2	19·0	17·6	22·0	22·6	28·9	14·1	5·8	23·1	171·3	19·0 +
12	18·5	25·3	19·1	23·6	26·2	29·8	16·4	5·6	30·2	194·7	21·6
13	19·9	24·8	17·3	23·6	27·1	30·6	12·9	5·0	24·8	186·0	20·6 +
Annual Total	243·8	301·4	259·6	301·0	311·4	382·9	225·6	77·5	349·7	2,452·9	272·0
Yearly Average	18·75	23·17	19·96	23·15	23·95	29·45	17·35	5·96	26·9	188·6	20·9 Average

In 1915 it was impossible to prepare the seed bed, the rainfall for the first four months was only 110 points.

In 1917 seeding rains were delayed until the end of August. During April, May, June, and July only 84 points of rain fell.

In 1919 the rainfall during June, July, August, September, and October was 102 points.

SNOW IN ARGENTINA.

While Argentina has a large capacity for canesugar production, we now learn that they sometimes have severe snow falls and frosts. The illustration is a view of the cane field at the Tucuman experiment station where Dr. Cross, formerly of Louisiana, is now a director, and while Dr. Cross has had experiences of cold weather in Louisiana, we doubt of his ever having seen the cane field so covered with snow on the leaves of the cane as is shown in the illustration. We are indebted to Mr. George S. Brady, of the American Trade Commissioner, in the absence of the commercial attache, for the illustration and data.

It is said that for the first time in the history of Argentina snow fell in the northern provinces on 12th July, and completely killed the cane crop. It is estimated that fully one-third of the production of sugar will be lost. Some of the Argentina sugar men are of the opinion that grinding cannot continue through 15th September as estimated, and, as a consequence a considerably larger amount will be lost. Argentina lies about 26 degrees south of the equator, just outside the southern tropic, while the sugar districts of Louisiana lie about 25 to 30 degrees north of the equator. There is considerable similarity in the relative position of that section of Argentina and the sugar section of Louisiana. The month of July in Argentina, so far as the

PLATE 2.—SNOW IN ARGENTINA.

cane crop is concerned, would compare with the months of January in Louisiana, and long experience has taught us here to avoid any sugar cane grinding in January if practicable. Sometimes with large crops and bad weather our sugar grinding seasons have been extended into February, or even 1st March, but such seasons are generally disastrous. In Louisiana November and December are the months for harvesting sugar-cane crops, and great efforts are made to finish before the Christmas holidays. Tucuman, unless its temperature has changed by the topographical situation in some way, should be somewhat somewhat similar to the average Louisiana sugar season temperature. Here, where larger crops are made, it is quite common to prepare for the cold weather by cutting down large quantities of the cane and throwing them into what we call windrows, leaving the cane throughly well covered with their own leaves in such a way that freezing weather would not affect them. Our correspondent says that in Tucuman the canes were killed presumably by the freeze with the snowfall of which we give the illustration. There was a freeze in Louisiana in 1856 that seemed to have been as disastrous here as the recent freeze was in Argentina. We are lead to believe that our plan of windrowing in Louisiana would be quite a protection to sugar planters in Argentina whenever their cane harvests are delayed until July, which in their country south of the equator is the equivalent of our January, north of the equator.—"Louisiana Planter."

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, NOVEMBER, 1920.

There was a drop in the output for the month of November. Hot weather of a trying nature, accompanied by storms, caused the majority of the birds to slow down. Broodiness has been very tiresome, not only in the heavy section, but in the light section also, and in a number of cases two birds from a pen were removed to the broody coops. More Leghorns have been broody during this than in the three preceding tests. L. G. Innes and N. A. Singer's pens of White Leghorns each laid 159 eggs for the month, and in the heavy section R. Burns's pen of Black Orpingtons put up the highest total of 146. The following are the best sequences now in progress, or finished up during the month of November:—

A. Shanks's "B" bird, an unfinished sequence of 89 eggs; R. Burns's "C" bird, an unfinished sequence of 36 eggs; L. G. Innes's "D" bird, an unfinished sequence of 56 eggs; N. A. Singer's "D" bird, an unfinished sequence of 48 eggs; D. Fulton's "F" bird, finished a sequence of 34 eggs on the 26th; Dr. Jennings's "B" bird, finished a sequence of 43 eggs on the 18th; N. A. Singer's "E" bird, finished a sequence of 47 eggs on the 6th; Haden Poultry Farm's "A" bird, finished a sequence of 43 eggs on the 22nd; E. F. Dennis's "E" bird, finished a sequence of 76 eggs on the 12th.

There was one death during the month, A. Shanks losing his "C" hen on the 21st, through ovarian complications. The following are the individual records, with the classification of the various pens:—

Competitors.	Class.	Breed.	Oct.	Total.
LIGHT BREEDS.				
*G. Trapp	I.	White Leghorns ...	137	1,046
*Haden Poultry Farm	I.	Do.	140	1,044
*O. W. J. Whitman	II.	Do.	136	1,035
*J. M. Manson	I.	Do.	144	1,010
Geo. Lawson	I.	Do.	136	1,001
*J. D. Newton	II.	Do.	139	1,000
*J. J. Davies	I.	Do.	137	998
*Quinn's Post Poultry Farm ...	II.	Do.	135	991
*W. Becker	I.	Do.	141	974
*N. A. Singer	I.	Do.	159	974
*Dr. E. C. Jennings	I.	Do.	139	971
*L. G. Innes	II.	Do.	159	962
Mrs. R. Hodge	I.	Do.	146	940
*W. and G. W. Hindes	I.	Do.	120	939
*J. H. Jones	I.	Do.	126	935
*G. Williams	I.	Do.	132	935
*E. A. Smith	I.	Do.	137	935
*H. Fraser	I.	Do.	130	933
*T. Fanning	I.	Do.	129	923
*S. McPherson	II.	Do.	97	920
*Mrs. L. Anderson	I.	Do.	132	910
B. Chester	I.	Do.	137	900

EGG-LAYING COMPETITION—*continued.*

Competitors.	Class.	Breed.	Oct.	Total.
LIGHT BREEDS—*continued.*				
S. L. Grenier	I.	White Leghorns ...	123	892
*Mrs. L. Henderson	I.	Do.	135	880
*Thos. Taylor	II.	Do.	140	878
*Range Poultry Farm	II.	Do.	123	877
*S. W. Rooney	II.	Do.	122	877
Thos. Eyre	I.	Do.	110	876
Avondale Poultry Farm	III.	Do.	109	828
B. Chester	I.	Do.	108	823
W. Morrissey	I.	Do.	92	819
H. P. Clarke	I.	Do.	109	805
R. C. J. Turner	II.	Do.	121	803
C. Langbecker	IV.	Do.	103	776
S. Chapman	I.	Do.	131	769
C. H. Towers	I.	Do.	109	765
C. M. Pickering	III.	Do.	100	760
W. D. Evans	II.	Do.	125	745
H. A. Mason	III.	Do.	125	745
A. J. Andersson	III.	Do.	83	736
C. A. Goos	II.	Do.	122	700
Miss E. M. Ellis, not judged ...	...	Do.	Withdrawn	583
HEAVY BREEDS.				
*E. F. Dennis	II.	Black Orpingtons ...	126	1,028
*R. Burns	II.	Do.	146	1,025
*R. Holmes	I.	Do.	113	1,022
*A. Shanks	I.	Do.	139	1,016
*D. Fulton	I.	Do.	102	980
*E. Morris	II.	Do.	128	969
*A. Gaydon	II.	Do.	127	969
*W. Smith	I.	Do.	123	932
H. M. Chaille	I.	Do.	82	922
*A. E. Walters	II.	Do.	106	914
*E. Oakes	I.	Do.	134	893
*J. A. Cornwell	I.	Do.	130	889
J. E. Smith	I.	Do.	107	874
*T. Hindley	IV.	Do.	119	873
*R. B. Sparrow	III.	Do.	114	850
Mrs. G. H. Kettle	I.	Do.	119	842
Parisian Poultry Farm	I.	Do.	109	839
R. C. Cole	II.	Do.	116	822
G. Muir	II.	Do.	87	820
*J. E. Ferguson	I.	Chinese Langshans ...	91	772
*E. Stephenson	II.	Black Orpingtons ...	110	770
*Nobby Poultry Farm	I.	Do.	99	766
G. Flugge	IV.	Do.	109	652
Total	...	...	7,814	57,652

* Indicates that the hen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C	D.	E.	F.	Total.
LIGHT BREEDS.							
G. Trapp	186	171	182	170	179	158	1,046
Haden Poultry Farm	197	148	193	181	160	165	1,044
O. W. J. Whitman	162	162	189	171	164	187	1,035
J. M. Manson	165	174	183	167	155	166	1,010
J. Newton	193	158	171	119	176	183	1,000
J. J. Davies	175	167	166	174	166	150	998
Quinn's Post Poultry Farm	184	172	173	162	144	156	991
W. Becker	170	166	178	161	139	160	974
N. A. Singer	165	148	169	186	160	146	974
Dr. Jennings	148	184	149	149	156	185	971
L. G. Innes	111	154	181	172	188	156	962
W. and G. W. Hindes	161	158	135	166	150	169	939
J. H. Jones	155	154	160	168	166	132	935
G. Williams	151	157	160	153	179	135	935
E. A. Smith	155	139	172	152	156	161	935
H. Fraser	135	154	169	165	162	148	933
T. Fanning	64	170	162	173	179	175	923
S. McPherson	176	175	91	137	186	155	920
Mrs. L. Anderson	178	165	165	142	130	130	910
B. Chester	152	128	157	159	155	149	900
Mrs. Henderson	132	143	155	143	164	143	880
Thos. Taylor	171	156	117	158	137	139	878
Range Poultry Farm	107	155	155	172	139	149	877
S. W. Rooney	123	124	171	137	154	168	877
HEAVY BREEDS.							
E. F. Dennis	182	155	167	180	164	180	1,028
R. Burns	169	153	197	154	185	167	1,025
R. Holmes	161	178	167	169	176	171	1,022
A. Shanks	150	175	153	192	140	206	1,016
D. Fulton	167	181	155	168	92	217	980
E. Morris	169	164	170	134	163	169	969
A. Gaydon	163	199	160	139	126	182	969
W. Smith	110	189	170	171	148	144	932
A. E. Walters	140	153	141	174	130	176	914
E. Oakes	134	179	157	82	174	167	893
J. Cornwell	148	179	154	106	135	167	889
T. Hindley	155	176	142	169	103	128	873
R. B. Sparrow	157	92	162	141	134	164	850
J. E. Ferguson	91	137	98	127	178	141	772
E. Stephenson	168	119	132	139	111	101	770
Nobby Poultry Farm	153	195	83	199	116	20	766

CUTHBERT POTTS,
Principal.

NOTES ON "TRUENESS TO TYPE."

Light Breeds.

Name.	Class.	Comments.
Mrs. Anderson	1	Good size; inclined to upright comb.
H. Fraser	1	Solid uniform pen; splendid doers.
B. Chester	1	Uniform; ideal headpieces; C and D a trifle narrow across shoulders.
Quinn's Post Poultry Farm	2	E and F high tail carriage; great stamina; reachy carriage.
T. Fanning	1	A pleasing pen; nice full bone.
E. A. Smith	1	Another pleasing pen; E and F our choice.
Thos. Taylor	2	Diminutive combs; too upright in carriage.
Range Poultry Farm	2	Tail carriage variable; good bodies.
S. W. Rooney	2	Lack uniformity; A our preference.

Name.	Class.	Comments.
O. W. J. Whitman	2	Hard good doers; headpieces away from a Leghorn; reachy carriage.
S. McPherson	2	Very uniform in type; B side spikes.
J. H. Jones	1	A good pen throughout.
G. Trapp	1	Very even; beautiful head points; great doers.
L. G. Innes	2	Could do with more substance; outline good.
W. Becker	1	Uniform; great doers.
Geo. Williams	1	A very pleasing pen; tight in feather.
J. J. Davies	1	Good all round pen; excellent headpieces.
Dr. Jennings	1	As near our ideal as any in the test.
N. A. Singer	1	Uniform in outline; great workers; A and F our choice, if any.
Haden Poultry Farm ..	1	Good in stamina which carries the pen through; combs inclined to be too upright.
J. W. Newton	2	Side spikes in evidence; good constitutions.
W. and G. W. Hindes ..	1	A fine pen throughout; every bit Leghorn.
J. M. Manson	1	A trifle small; E ideal.
Mrs. Henderson	1	Very uniform; F rather high in tail.
S. Chapman	1	Good headpieces; a satisfactory pen.
E. Chester	1	Very uniform; ideal heads.
Avondale Poultry Farm ..	3	Too small.
C. Goos	2	Good outline and Leghorn characteristics, but not the best of doers.
R. Turner	2	Lack uniformity.
G. Lawson	1	Even; hard; good doers.
W. D. Evans	2	Very uniform; splendid outline; poor feeders.
Thos. Eyre	1	Very even; a good hard pen.
C. Langbecker	4	Lack uniformity; inferior headpieces.
H. Mason	3	On small side; not the best of doers.
C. Pickering	3	Too fine; lack substance; diminutive heads.
C. H. Towers	1	Uniform; good doers.
S. L. Grenier	1	Not the largest, but hard; good doers.
W. Morrissey	1	Uniform; good in head points.
A. J. Anderssen	3	Size and type variable.
H. P. Clarke	1	Good long backs; possess size.
Mrs. R. Hodge	1	The largest in the test; grand outlines; beautiful headpieces; one inclined to too high tail carriage.
Heavy Breeds.		
T. Hindley	4	Type variable; C and D white lobes.
J. Cornwell	1	One of the best utility Orpington pens in test; lovely heads.
E. Morris	2	Type variable.
E. A. Walters	2	One of the largest pens in test; inclined to leg and tail; grand eyes.
R. B. Sparrow	3	Full of variations.
Nobby Poultry Farm ..	1	Uniform; could do with a little less tail.
A. Shanks	1	A very pleasing pen; D our choice, if any.
R. Burns	2	Type variable; we prefer A.
E. Oakes	1	Good, strong, uniform pen; a little too much tail; beautiful heads.
W. Smith	1	Uniform, solid pen; E pale in eye colour.
E. Stephenson	2	Variable type; too long in back and tail.
E. F. Dennis	2	E small; otherwise good pen.
J. E. Ferguson	1	Uniform; free from the defects seen in previously competing Langshans.
R. Holmes	1	Uniform; good heads.
D. Fulton	1	Uniform pen; we like C very much.
J. Gaydon	2	Inclined to too much tail.
Parisian Poultry Farm ..	1	Big, solid hens; great eyes.
Mrs. G. H. Kettle	1	Very uniform; neat headpieces.
H. Chaillie	1	Just managed this class; would like to see a little more substance.
G. Flugge	3	Too taily.
G. Muir	2	Side spikes in evidence; inclined to too high tail carriage.
J. E. Smith	1	Very even pen; lower to ground than the majority.
D. Cole	2	Variable type; good doers.

DOES POULTRY KEEPING PAY?

By R. T. G. CAREY (Muscovy Breeder), Beerwah, Queensland.

"Sow in waste and you will reap in want," is a maxim the truth of which the poultry industry is already beginning to realise and will realise much more fully, I am afraid, ere long. It is the true adage, if economy is not fully exercised, seeing that some middlemen are not contented with reasonable profits. In November nearly all the market agents notified their higher charges upon the sale of our product, as well as increased charges for commissioned work they do for the farmer, with the result that the greatest distress is being experienced in the poultry world. Large breeders, with a record of over half a century's successful trading behind them, have culled their stocks to the verge of non-existence; consequently, the outlook for the future is gloomy since supplies of birds to replenish the outlying districts are so scarce that those breeders are at their wit's end to promptly meet demands. It is no wonder that buyers of young stock, be it baby chicks or day-old ducklings, are unable to have their orders filled on dates specified, but are told they have to wait for a month or a little longer, because the rush was so great, or the stock was not on hand. I here show some figures from a prominent plant, its cost of maintenance, the receipts, &c., to and from all sources, as follows:—

Expenditure.

	£	s.	d.
Postage stamps	2	16	9
Freight	4	2	9
Feed bill	54	19	8
Advertisement	25	10	0
Printing catalogue	8	8	0
Total expense	95	17	2

Income.

Books sale	5	7	6
Eggs sale	33	10	3
Duck sale	25	11	0
Duckling sale	52	12	0
Fowl sale	12	11	9
Chick sale	15	15	0
Sundries	6	4	3
	£151	11	9
Value of stock on hand	100	0	0
Value of plant	45	0	0
Plant's total value	145	0	0
Add income	151	11	9
	£441	11	9
Deduct cash expenses	95	17	2
Actual profit	345	14	7

From eighty Muscovy ducks and thirty White Leghorn fowls for eleven months, the actual cash income (£55 14s. 7d.) will be about £1 sterling per week. The return, though showing a profit, would not have done so had full rations been given; in fact, the whole flock was upon a war-saving diet, and only two meals per day, consisting chiefly of a wet mash (one part bran, one part pollard, two parts chaffed herbage). The birds, though lean, have kept excellent health and vigour; therefore the problem of feed was solved during the high cost periods, still adhering to the war-ration, as I term it. I shall continue this course until poultrymen get their fair value, and a good article at reasonable prices that will allow them to raise larger numbers of birds, and enable Australia to be again replenished with good standard poultry, and not the utility class which is a cloak-word whereby all faults can be hidden, and a channel through which the advocates of the utility class can steer their bark of faulty fowls. I advise your readers to study what one hundred odd fowls can earn, through systematic practice, and still carry a new one hundred forward for the following year.

ABOUT INCUBATION.

Usually, incubation brings disappointment to an amateur, who generally fails with the first trial. The hopeful beginner buys a machine, unpacks it, and assembles the parts together with youthful glee, erects it in any spare space he can find, perhaps, for just temporary convenience, generally in an unsuitable building. He then scours the markets or the country for eggs and puts them into his new toy, fondly hoping that in three weeks or in twenty-one days he will have nine-and-ninety baby chicks to rear, and diligently carries out the instructions given in the book supplied by the manufacturer of the instrument. He trims his lamp, fills the water tank (if a hot-water machine), watches the thermometer carefully, which seems to keep pretty even registration, examines his eggs from time to time, turns them a couple of times daily as well as airing or cooling them; then he gets sorely puzzled as to whether they contain chicks or not; and as the twenty-first day approaches he hopes and hopes in vain, but his expected huge family does not appear. My own experience was thus sorely bought and I have had failures in machines which afterwards hatched most successfully.

Do not be disappointed if the above is part of your experience, as few succeed at first. Be a "Robert Bruce—King of Scotland." Try, try, try again. Decide upon your programme for the year; secure your eggs for hatching from reliable breeders, and hatch early, as early-hatched chickens thrive best.

Do not be sad or downhearted by a failure, but, rather, keep plodding on. Of course, grit, determination, and will are sure, in the end, to conquer a great many initial mistakes. Be willing to work, quick to see and execute. Be patient in waiting and thorough in doing. Go into the business and you will win. Care of the incubator is a very important factor; you need to be extremely careful about its use. Do not think of selfish economy in its purchase, but wisely purchase the best of each article needed for hatching, be it machine, eggs, fuel, or brooder, then you will not grudge the initial expense.

CHICKEN-POX.

By J. BEARD, Poultry Instructor.

This disease affects chickens, pigeons, canaries, and turkeys; geese, ducks, and guinea-fowls are immune. Turkeys are very liable to contract it. As for fowls, their resistance generally varies inversely with the age of the bird.

The death-rate from the disease among chickens from two to three weeks old is very often 100 per cent., whilst with chickens two to four months old it is sometimes nil. Birds of pure breed are less resistant than their cross-breeds; Minorcas and Leghorns are the most susceptible varieties.

The infection can be either mild or severe, depending on the number, size, and seat of the nodules. At times the nodules are not bigger than a sorghum seed, and fall off without any treatment, the infection disappearing in a week's time without affecting the health of the birds. At other times they are very large in size; inflammation sets in through scratching, and the nodules become tumour-like. When the eyelids and angle of the mandibles are affected, the beak remains open, the bird being unable to close or open it. The inflammation soon reaches the mouth, which is covered by a thick, false membrane. The birds, being thus blind and unable to pick their food, soon become anæmic, emaciated, and die of starvation, or are poisoned by other germs which infect the nodules and the mucous lining of the mouth. This disease prevails in the summer months, the deathrate being heavy in January and February.

Chicken-pox is said to be highly contagious, though the causes of infection have never been clearly defined. It has also been noticed that the disease is most prevalent during dry seasons, and this gave rise to the conclusion that dust was the medium of infection and that the disease is transmitted from bird to bird.

This theory does not hold good when one considers that the disease may appear suddenly in localities where it was unknown before. It is evident, therefore, that the infection is carried through some other channel.

From observations made during many years, I am of the opinion that the infection is transmitted directly from one bird to another in exceptional cases only, but is more usually conveyed by a "vector," which may be the mosquito, or any night-biting insect such as bugs, or sandflies, or the various fowl lice.

To prevent the disease from spreading, the healthy birds should be separated from the sick ones at night and placed in mosquito-proof cages.

TREATMENT.

There is no specific remedy known against chicken-pox. The best known remedies have never given any good results, except in mild cases which would have recovered more quickly had they not been treated at all.

Cauterisation, by means of metallic salts, generally increases the inflammation and should only be used in special cases, for example, when mouth and eyes are to be dressed.

My experience has shown that the less one interferes with the sickness the quicker is the recovery. The removal of the crust with a view to obtaining a rapid cure complicates matters, since the sores which were protected by their crust are thus exposed to further infection. It may, however, be necessary at times to interfere, in order to avoid ophthalmia or to prevent the false membranes from invading the mouth.

The false membranes arise from the nodules existing on the margin of the beak and at the junction of the mandibles. In such cases the crust, which must be previously softened with a lukewarm solution of boric acid, is removed and the sore coated with iodine by means of a brush. The false membrane of the mouth can be detached by means of a swab and the front painted with iodine and glycerine, or with some form of paint containing tannic acid.

PREVENTION.

During January and February avoid feeding the chickens with starch-containing foods, such as maize in any form, potatoes, or household scraps; supply a little fresh cooked meat once a week only; give a plentiful supply of green food and dry bran; give epsom salts once a week and add one teaspoonful of sulphur to the mash for twenty chickens once a week, the latter to be well mixed, otherwise some of the chicks would get more than their share, while others would be left without. Add Douglas's mixture to the drinking water once a week during normal times, and twice a week during sickness or moulting.

REMEDY FOR SCRUB TICKS AFFECTING DOGS, FOALS, AND CALVES.

The best specific for this trouble, so common in scrub country, is that given by the Chief Inspector of Stock, Mr. A. H. Cory, M.R.C.V.S., so far back as November, 1915, as follows:—

Scrub ticks cause a great deal of trouble to stockowners in certain districts, with a large percentage of mortalities. It has been stated that these ticks do not harm the animals during the first four days' attachment, so it is recommended that where scrub ticks are prevalent, valuable animals should be thoroughly examined every second or third day.

It has been proved that trypan blue—injected under the skin—is a specific for this disease in the dog; the paralysis soon improves, and in a few days the animal thoroughly recovers; one dose of the trypan blue is usually sufficient.

A 2 per cent. solution (about 9 grains to a fluid oz. of water) is made by dissolving the trypan blue in boiling water; a sediment falls as the solution cools, and this should be removed by filtering through a funnel in which a properly-folded filter paper is placed, or a fine piece of clean linen which has been previously boiled. The hypodermic syringe and needle, before being used, should be placed in a dish containing cold water, then placed over the fire and the water boiled for some ten minutes; this thoroughly sterilises the syringe and needle, which is now ready to use when the solution to be injected has cooled.

The injection can be made anywhere under the skin, but the best positions are either in front of the chest or behind the shoulder, the skin in these positions being loose a fold of which is easily caught up by the finger of the left hand, whilst the needle is inserted with the right hand. It is advisable to clip off the hair and disinfect the spot chosen before introducing the needle.

A dose for dogs, according to age and size, varies from 1 to 5 drachms, or 1 to 5 teaspoonfuls.

The dose for calves and foals varies (according to age and size) from ½ oz. to 2½ oz., or 1 to 5 tablespoonfuls.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING NOVEMBER, 1920 AND 1919, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of Years' Records.	Nov., 1920.	Nov., 1919.		Nov.	No. of Years' Records.	Nov., 1920.	Nov., 1919.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	2·23	19	0·59	0·58					
Cairns	4·15	38	4·66	2·26	Nambour	3·73	24	6·57	0·30
Cardwell	4·24	48	2·87	1·08	Nanango	2·60	38	3·05	0·65
Cooktown	2·84	44	0·97	0·37	Rockhampton ...	2·14	33	3·24	0·63
Herberton	2·47	33	0·85	0·61	Woodford	3·09	33	6·25	0·50
Ingham	4·02	28	2·27	1·27					
Innisfail	6·23	39	4·89	1·23					
Mossman	4·86	12	4·18	2·52	*Darling Downs.*				
Townsville	1·90	49	0·73	0·16					
					Dalby	2·55	50	1·62	0·48
Central Coast.					Emu Vale	2·53	24	3·91	3·46
					Jimbour	2·39	32	2·18	0.41
Ayr	1·79	33	1·81	1·05	Miles	2·55	35	1·38	0·82
Bowen	1·34	49	1·15	0·53	Stanthorpe ...	2 73	47	2·19	0·48
Charters Towers ...	1·66	38	0·15	0 04	Toowoomba ...	3·24	48	6·06	0·77
Mackay	2·96	49	1·92	1·47	Warwick	2·56	33	2·76	2·40
Proserpine	3·24	17	1·46	2·27					
St. Lawrence ...	2·40	49	1·48	0·61					
					Maranoa.				
South Coast.									
					Roma	2·09	46	0·99	0·38
Biggenden	2·72	21	2·56	Nil					
Bundaberg	2·64	37	2·17	0·63	*State Farms, &c.*				
Brisbane	3·70	69	6·28	0·38					
Childers	2·81	25	2·29	0·12	Bungeworgorai ...	2·19	6	0·76	0·53
Crohamhurst ...	4·65	25	5·54	0·58	Gatton College ...	2·67	21	3·33	0 65
Esk	3·12	33	5·10	1·09	Gindie	2·19	21	0·85	0·27
Gayndah	2·83	49	2·59	0·33	Hermitage ...	2·50	14	3·89	1·49
Gympie	3·13	50	4·56	0·05	Kairi	2·65	6	1·18	0·40
Glasshouse M'tains	3·61	12	5·62	0·04	Sugar Experiment				
Kilkivan	2·50	41	5·77	Nil	Station, Mackay	2·70	23	2·33	1·28
Maryborough ...	3·11	49	2·58	0·08	Warren	3·20	6	3·85	0 55

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for November this year, and for the same period of 1919, having been compiled from telegraphic reports are subject to revision.

GEORGE G. BOND, State Meteorologist.

Dairying.

DEVELOPMENT OF FLAVOUR IN BUTTER.

BY T. HAMILTON, M.A., N.D.A. (honours), N.D.D., Dairy Expert, Department of Agriculture, Rhodesia, S.A.

The faulty flavours in butter which must be guarded against are those commonly described as "rancid," "fishy," "cheesy," "cowy," "stale," "mouldy," "musty," "woody," and many which can be generally classed as "unclean."

A rancid flavour is one which often develops when butter is left standing either under ordinary conditions or in cold storage. It is one of the common faults in South Africa, both of farm butter and of creamery butter; but because of the difficulty of controlling temperature on the farm during the hot months it more frequently occurs in the case of the former than in the latter.

In ordinary creamery practice the flavours in the cream delivered to the factory are very varied, but a bad-flavoured cream, or one which will result in a rancid flavour being produced, is almost invariably caused by lack of cleanliness at some stage of the preparation of the cream for butter-making. Of course there are exceptions, which may be due to the cows eating some rank flavoured weed, especially in the early spring, when anything green and succulent is eagerly sought after, or which may be due to the inability of the farmer to cool the cream sufficiently to enable it to stand a long journey in the hot weather. Usually, however, when a consistently bad flavoured cream is produced at any particular farm, a general clean up will remedy the fault.

Rancidity in butter is not only due to a particular germ found in over-ripe or fermented cream, but it is also due to the butter being insufficiently washed. During the hot weather it is most difficult to get a good grain, for the normal temperature of the cream during the hot weather often exceeds 70 degrees F., and it is very difficult to get washing water below this temperature. The consequence is that the butter is soft, and it is almost impossible to wash the buttermilk out of the butter. Carefully churned and well washed butter contains an extremely small proportion of curd or nitrogenous matter on which germ life can thrive, consequently such butter, provided it is kept under proper conditions of temperature and surroundings, will retain its good flavour almost indefinitely. However, if for reasons outlined above a large proportion of buttermilk is retained in the butter, this nitrogenous matter is likely to be attacked by bacteria which will cause a rancid flavour to develop in two or three days. Therefore butter made in the height of the season, when cream is plentiful, and when the temperature both of the atmosphere and of the water is high, should never be stored, but should be disposed of as quickly as possible. The alternative is, of course, to send the cream during the hot months to a creamery, where the temperature can be controlled, and where the butter made can be stored under almost ideal conditions.

"FISHY" FLAVOUR.

This is one of the commonest faults to be found in creamery butter which has been stored for a considerable period awaiting sale or export. In Australia, as in South Africa, the development of this flavour causes losses amounting to thousands of pounds annually, and many investigations have been undertaken to account for this particular taint. It is generally attributed to the feeding of rank herbage, such as is found on the coastal belt, and also to cream being ripened to a high degree of acidity before being churned.

The writer has frequently observed the development of a "fishy" flavour in butter in cold storage where the temperature varies from day to day. Nothing is worse for the keeping qualities of butter than constant variations in temperature, and it is essential that as low a temperature be maintained as is possible. If the temperature of the cold store rises above 30 degrees F., "fishiness" develops, and becomes more pronounced as the temperature rises. The best temperature at which to store butter in cold storage seems to be from 5 degrees F. to 15 degrees F., and critics of South African butter are unanimous in their opinions that the lower the temperature at which the butter can be carried, the better the flavour when it arrives on the London market.

"CHEESY" FLAVOURS.

These flavours are generally due to the decomposition of the proteid matter retained in the butter. Such butters generally are streaky, the white streaks being due to caseous matter being left either through neglecting to strain the cream before churning or through neglecting to wash the butter sufficiently when in the granular stage.

"UNCLEAN" FLAVOURS.

are self-explanatory, and if the cause is removed and the cream properly treated none of these objectionable taints need be developed.

"WOODY" FLAVOURS

are caused either by improper treatment of the cream or by bad packing. There is a great dearth of wood suitable for butter boxes in South Africa, and almost all boxes are imported from Canada or Sweden. Some experiments have been tried with boxes made of South African timber, and the boxes have been treated by painting them on the inside with melted paraffin wax and other materials, but up to the present these experiments have not proved a success so far as the export trade is concerned, and the more expensive imported box has come into common use. There is a wide demand for butter boxes in the Union and Rhodesia, as the annual consumption must exceed a quarter of a million, and if this demand could be met by utilising some of our native timbers, a great saving would be effected and a substantial sum of money retained in the country. The extent of this saving can be easily calculated, when it is realised that an imported butter box costs approximately 4s., and that no allowance is made for boxes when butter is exported.

"MOULDY" AND "MUSTY" FLAVOURS.

are generally due to neglect in storing the cream or through keeping the lids of the cans firmly closed whilst waiting for despatch to the creamery. It is remarkable how many farmers neglect the elementary precautions necessary for the production of good flavoured cream, and how many cans of cream are received at a creamery the top of which is covered with a thick growth of green mould. This green mould would never develop if the can before being despatched to the creamery was regularly stirred and allowed to stand in a cool place covered only with a damp muslin cloth.

"FEED" FLAVOURS

are very common when the grass is rank, especially on the coastal belts. At such times and in such districts it is almost impossible to make a first grade butter for export, as the taint seems to develop with age. When the practice of the winter feeding of dairy cattle, now only too rare, becomes more common in Rhodesia, we can expect more of these taints. When silage, rape, or other rank-smelling feed is given, it is always preferable to give it to the cows after the operation of milking is complete. It is equally important that every precaution should be taken to have clean stables and a pure atmosphere whilst milking is taking place.

"COWY" FLAVOURS

are generally the result of unclean stables and the use of "colostrum" or "beastings." No milk from a newly calved cow should be mixed with other milk until at least eight days have elapsed from calving.

"STALE" FLAVOURS

can be caused by keeping the cream too long before churning, but a more frequent cause in South Africa is the use of rusty cans and other receptacles. The danger of the use of these cans is recognised in all dairying countries, and under the Dairy Act of the Union powers are given to inspectors to destroy such cans if their use is persisted in. There can now be no excuse for a farmer using rusty cans, as there are various factories and re-tinning plants in South Africa, where cans and other dairy utensils can be repaired and made almost equal to new. This is a great consideration when the price of all dairy utensils is so high, and full use should be made of these factories by the dairymen of this Territory.—"Rhodesia Agricultural Journal."

MOLASSES AS A FOOD FOR MILKING COWS.

A correspondent asks for information concerning the merits or demerits of sugarcane molasses as a food for milking cows. The Government Dairy Expert, Mr. W. E. Graham, says:—"I have to advise that sugarcane molasses has a comparatively low value as a feed for milch cows. Molasses may be accepted as being rich in carbo-hydrates, but it contains a very small percentage of protein, and it is the latter constituent in a food that enhances the value of it for dairy stock. However, molasses is frequently found serviceable for the purpose of adding to the palatability of rough feeds, and consequential to the addition of molasses to the rough class of feeds, these are more readily partaken of by stock. Further, molasses exerts a laxative influence upon stock, and this is advantageous when dry, fibrous foods are fed. As you have not given details of the feeds which comprise the rations in which molasses is included, no opinion can be offered as to whether the molasses would be of value in your particular circumstances.

Tropical Industries.

COFFEE CULTIVATION IN QUEENSLAND, NO. 2.

BY T. A. BROMILEY, Instructor in Coffee Cultivation, Department of Agriculture and Stock.

Coffee is a hardy shrub, but there are certain conditions which must be observed if it is to be cultivated for commercial purposes. First, there must be freedom from frost. Coffee will do its best at temperatures ranging from 60 deg. to 95 deg. Fahr., but will not suffer in the low 40 deg. Fahr. if not too long an exposure. It will also stand much higher temperatures than 95 deg. Fahr. if there are occasional falls of rain. This mention of rain is, of course, in consideration of crop. The tree will resist drought as well as any fruit tree grown in Queensland. Naturally, however, long spells of dry weather militate against the crop, as is the case with any other shrub or tree.

Strong, continuous winds are inimical to the plant, therefore the site selected for its growth should be determined to some extent by the direction and intensity of the prevailing winds of the district. In some areas, the S.E. winds are very trying, and it would be well to avoid exposure to such winds, if possible. In most districts of Southern Queensland, at any rate, north-east, north, and north-west aspects are good unless some unusual local feature exists.

Undulating land is better than flat land in that it, generally speaking, drains better—an important feature, as good drainage is absolutely necessary to the health of the tree. Where natural drainage is not good it must be made so artificially. Hillsides suit coffee well, but they are liable to wash in heavy rains, unless there are plenty of rocks and boulders, to which the tree does not object, and soil enough to get its roots well into. Remembering this fact, many a piece of land, quite unsuitable to horse work, could be turned to profitable account.

Any fairly fertile land suits coffee. Red volcanic is among the best, but, as a rule, it is very porous and soon feels the effect of a dry spell of weather. When the trees have attained their fourth year of growth, however, they cover the ground so completely that evaporation from the soil is much mitigated and the roots have got down to the normal moisture level. Scrub lands, especially the foothills of scrub-covered volcanic ranges, are the best possible for coffee, provided, of course, that there is a fair rainfall, which there usually is in such localities.

Not only does the plant accommodate itself to varying qualities of soil, doing well in most, but it as readily adapts itself to proximity to the sea, or long distances from it. But, from the writer's own observation, it succeeds best at distances of 1 mile to, say, 20 miles of the sea. As has been said, good crops have been taken from trees growing not many yards away from salt water, and only a few feet above it.

Having now reviewed the necessary conditions for the successful production of coffee, in a very brief manner it is true, the next consideration is the obtaining of plants. This involves the procuring of seed and making of a nursery bed.

For the bed, select a slightly sloping site. Dig the soil well to a depth of 12 inches, removing all roots and stones, if such there be. Rake well and finish off smoothly. Dig a shallow trench on the highest side, a little above the bed to carry away excess of rain. Make the bed, or beds, 3 feet wide so as to be able to reach conveniently from either side for weeding, if necessary. Paths between beds should be 18 inches wide to facilitate walking with a watering-pot if irrigation becomes necessary, as in most districts it will. The bed must be shaded in the following, or similar manner:—Procure a few forked "sticks" about 6 ft. 6 in. long to bottom of fork; erect these around the bed, leaving them about 5 feet out of the ground. A few light, straight saplings placed in the forks connecting the whole will make a frame, upon which lay a few leafy branches. On them, again, place several light saplings to prevent the branches being carried away by the wind. This shade should extend to 18 inches outside the margin of the bed in every direction. It must be remembered that the cover is only to be partial. If leafy branches are used the leaves will probably begin to fall about the time the seeds will be showing through

the soil; for that reason wattle branches answer well. The bed, &c., now being ready, proceed as follows:—

Line with a string, or mark with a straight stick, lines across the narrow way of the bed 3 inches apart. Dibble the seeds in to the depth of 1 inch, following the lines and spacing them about 3 inches one from the other, along the mark. It is well to put in a little peg at the beginning and end of each line so that the seeds may not be disturbed if it is found needful to prick up the surface of the bed before the seeds germinate. It is perhaps needless to say this pricking-up must be very lightly done, and only between the lines, not near the seeds. The germination of the seed will take from four to six weeks, depending much upon the weather. During the whole of this time the bed *must be kept moist,* if rainy weather supervenes, then less artificial watering will be needed. The soil must not be drenched, but, to reiterate, it must be kept moist till the seeds appear above ground. A finely perforated rose should be used for sprinkling. A covering of some sort of short mulching laid on the bed to the depth of about half an inch would, in some measure, prevent the packing of the soil by watering. Chaffed blady-grass, being free from seeds, would do very well. But if shade and watering be attended to, mulching will not be necessary. The young plants will be ready for the field by the time they have attained a height of 9 or 10 inches. This will be when they are about 9 months old. In practice this would mean the succeeding spring of the year. The distance apart of the plants in the field will vary a little according to the quality of soil. If the latter is only moderately fertile, 7 feet by 7 feet apart would be found about right. In good rich soil the plants should be 8 feet by 8 feet apart. In setting out the field for planting, lay off the base line, and set out the first line at right angles from it. Make the first hole for planting on the base, at the point of contact of the two lines. Now lay off the second line 8 feet from the first line, but instead of holing on the base line, measure off 4 feet from it along the second line. Proceed in this manner till the last line is reached. The trees will then stand alternate to each other throughout the plot. The holes to receive the plants should be made 18 inches each way—that is, in length, breadth, and depth.

In removing the soil, place the top half to one side and the lower half on the other side. It would be well to break up the bottoms of the holes with a spade-bar before filling in the soil that has been removed. In replacing the earth in the holes put in the surface stuff first; it is a good plan to rake in enough of the surrounding surface to fill up the hole, spreading the soil from the bottom of the hole where convenient. If the soil is good from top to bottom, then all can be restored to where it was removed from. The excavations should all be filled in, and the position the tree is to occupy marked by means of a stake or peg. If the plot to be planted is fairly level the lines may be easily spaced by means of three lining rods, and a correctly marked staff—8 feet in the instance now being considered—to indicate the position for the plant. A stake must be placed where shown by the measuring staff. If this is carefully done the trees, when established, will show lines in several directions, and facility of working with horse tools, as long as that may be safely done, be secured.

The operation of planting may be said to be the most important work in connection with the establishment of a coffee field. Planting, badly performed, can never be remedied; therefore, great care should be exercised at every step, and the recompense will be sure.

In removing the plants from the seed bed, be careful not to break the taproot if it can possibly be avoided. To reduce this risk to a minimum, carefully dig a trench in front of the first row of seedlings to a depth of 9 or 10 inches; it need not be wider than the spade can be worked in. Now insert the spade perfectly vertically in the mid-distance between this first row and the one nert behind it. Pull the handle of the spade so as to cause the plants to lean somewhat forward. Release the spade and insert again the width of itself in advance, and so on, to the end of the line the narrow way of the bed. If the spade be now carefully passed under the plants at the bottom of the trench, 9 or 10 inches down, and the plants pressed forward with the right hand on to the spade, they can be lifted with ease and the least possible risk of damage. Place the plants in a basket, or box, or, better than either, in a light barrow for transport to the field. Keep them covered from the sun with a sack. Keep as much soil as possible about the roots when removing them from the seed bed.

From the centre of each place intended for a plant remove as much soil as will easily accommodate it without cramping its roots. In particular, see that the taproot is kept perfectly straight. Hold the plant in position with one hand; with the other, draw in sufficient loose soil to fill to the surface, taking care to fill in well about the laterals, which must be kept as nearly as possible to the "lay" they assumed in the seed bed. Holding the plant firmly, now pour round it enough water to settle the

soil among the roots. Do not allow the plant to sink lower (as it would have a tendency to do under the watering), than a couple of inches below the general level of the surrounding surface. Do not use the boot to press the soil about the plant; the grouting in with the water will have settled the earth better than any foot pressure could. Shade the plants from the mid-day sun till they "take hold." A broad shingle or two thrust into the soil on the northern side, with an inclination over the plant, will do very well, but, if shingles cannot be procured, leafy branches may be used. When the young trees have attained a height of 12 inches they must be staked to prevent their being blown over by strong winds. The coffee plant does not make many surface roots till three or four years old; consequently, they are likely to suffer severely by being blown about, especially in the gales often accompanying our summer rains. In well-sheltered positions staking may, perhaps, not be necessary, but in most localities recourse must be had to stakes. As these latter may have to stand for a year or two they should be of timber that does not quickly rot. Split hardwood is the best, of course, but there are other timbers which would answer the purpose, no doubt. Knowing the object to be attained, the planter will select suitable stuff. The stakes, if of hardwood, should be 1½ inches by 1½ inches, and about 3 feet 6 inches long, and be driven a foot into the ground. Some planters use but one support, by which method the tree may be saved from being blown down, but certainly does not prevent it being lashed about, and, possibly, seriously injured. Two stakes driven firmly in, one on each side of the tree at a distance of, say, 10 inches from the stem, and placed in such a position as will sustain the tree against the prevailing winds, is by far the best method. Manila or coir lashing may be used for tying up; any soft, strong material will do. These lashings will need examining at intervals to see that the knots at the stems have not unduly tightened nor worked loose, and to replace any that may have broken either from strain or decay. Another plan which worked admirably, but needed care, was to take two or three turns of ti-tree bark around the stem, then take a length of No. 16 gauge galvanised wire, enough to reach from one of the stakes to the tree and back again to the stake; add to this length, enough wire to allow of tying. Double the wire in the middle, but not closely. Pass the bight round the stem of the tree. Twist the two sides of the wire together, but only just tight enough to dent the ti-tree bark with which the tree is shielded. Finally, secure the wire to the stake in a manner that it will not slip. Proceed in the same way on the other side of the tree and the job is done. In twisting the strands of wire, see that they engage each other, not one strand straight and the other coiled around it. If this work is properly done it will last as long as stakes are needed, but the tyings must be examined occasionally and loosed if they have become tight. There should be at least half an inch in thickness of bark round the tree. Keep the wire bands about two-thirds the height of the tree from the ground.

When the trees have grown to 4 feet 6 inches, or 5 feet in height, they must be "topped" or headed in. Perhaps the best height is 4½ feet. Cut down to within 1 inch of the first pair of primaries below 4 feet 6 inches. After pruning off the head, there will appear several suckers, perhaps half a dozen, shooting out from the first, second, and, perhaps, the third pair of primary branches. These must be rubbed out, or plucked out, as they appear. Sometimes this suckering will go right down to the bottom of the stem; all must be plucked off. One object of topping is to strengthen the lower limbs and fill in the tree. Coffee left to itself would grow tall and spindly, the lower branches would die out, and the top be clothed with a few green leaves on slender whip-like branches. Heading-in prevents this undesirable condition and throws the energy of the tree into the development of its lower parts, giving it spread of branches, thus shading the ground, and, of course, producing the crop where it can be easily gathered.

The matter of pruning, how and when to do it, is a question upon which there seem to be many opinions by coffee-growers in coffee-producing countries. So far as Queensland is concerned, the writer's long experience with the crop has convinced him that much pruning should be avoided; indeed, the less the better. But Queensland's rich soils and congenial climate encourage such an exuberance of growth in coffee that a certain amount of training becomes necessary to keep it in shape for profitable handling, &c., &c.

The first and perhaps the most important step in pruning is to open the centre of the tree. This is done by removing all branches from the primaries growing within 6 or 7 inches of the stem. By this means a sort of cylindrical space is made into which sunlight can penetrate, and through which the air can circulate. This is not only good for the health of the tree, but flowering is induced well inwards on the branches, and picking of the crop is much facilitated. Opening the middle of the tree to light and air sometimes causes a few branches to shoot directly backwards; needless to say these must be pulled out, also any branches growing vertically upwards or downwards. It happens at times, particularly when the tree is young,

and in vigorous growth, an errant branch will take a course right across the adjacent limbs. They are usually very thin, and the flowering notches far apart; pull them out as soon as discovered, as they only crowd the tree, draw sap from some other limb where it had better be allowed to flow, and they hamper the tree for picking.

On a primary there will sometimes develop a sort of notch or excrescence out of which dozens of shoots will come, and form what is called a "crow's nest," an appropriate name. Cut out the primary immediately at the back of the "nest." From the nearest eye to the stump will grow two or more shoots; remove all but one. With care this can be trained to assume the position that was occupied by the severed branch. If the tips of any of the primaries die, as they sometimes do, from overbearing, or from spells of drought when heavily laden with fruit, cut back to where the branch is green—that is, not dried up. Break out, or cut out, any dead wood as it makes. This, however, is not likely to appear till after some years of bearing, if the tree is growing under favourable conditions, and has had fair attention.

The foregoing directions for pruning, it is thought, will be sufficient for general purposes, but the observant grower may find occasion for a more free use of the knife, but, as has been said, pruning should be kept to a minimum.

The cultivation of coffee is in some respects different to that of any other variety of fruit. Until the tree is nearing its third year, light scarifying may be practised, keeping the implement outside the reach of the limbs. Nearing the fourth year, surface roots begin to occupy the ground; to wound these is to seriously injure the tree. Light chipping with the hoe is best, but on no account should a cutting tool enter the ground under the shade of the branches. If the trees have been looked after their own shade will prevent much weed growth, but if weeds have got under the branches, pull them out by hand. Weeds chipped from between the trees may be pushed under the branches, using care not to contort the latter. If the grower will examine the ground under his four-year-old trees he will find it "choke full" of fine roots. These are the fruit-producing agents, to injure which is to, more or less, reduce the size of berry and quantity of crop, and, eventually undermine the constitution of the trees.

In ordinary cases coffee flowers in Southern Queensland from mid-October to the first week in December; this may vary considerably with the character of the season. If good-growing weather, flowering may commence as early as the beginning of October and continue till the middle of November. If the season has been dry, flowers may not show till mid-December, and then only partially, but such late flowering does not often occur. Coffee makes the best of a small amount of moisture.

In the same localities as abovementioned, the berries begin to ripen in late May or early in June, and, usually, picking is finished by mid-September. Picking, however, is not continuous during this period. The early ripening, being small, is off in about a fortnight, then there is a spell of two to three weeks before pickers need go into the field again. This, the second picking, is the heaviest of the season, the weight brought in being equal to three-quarters of the season's crop. If picking has been delayed from any cause such as wet weather or shortage of pickers, there will be no break in field operations till the last of the crop is housed, which will be, in normal seasons, about the latter half of September. Under unfavourable conditions, such as a delayed start, or drought conditions, the last of the crop may not be got in before mid-December, but this very rarely happens.

Pickers are provided with bags or pockets tied around the waist and suspended from the shoulders by bands. These bags are best made of stout sail cloth about 10 inches wide and 8 inches deep. Make the back of the bag—*i.e.*, that part touching the body, 3 inches deeper than the front, turn down a hem of 1 inch, through this hem place a thin piece of wood reaching across the cloth but protruding from the ends of the hem, and fasten the pocket to the lath by means of a copule of tacks driven in at the extremities. This prevents the bag wrinkling up. Sew in a gore at each side, about 1½ inches wide at the top. Such a pocket holds 5 or 6 pounds when full, quite heavy enough for convenience. Empty kerosene tins fitted with cross-handles are very suitable for carrying the berries in to any place where there is a larger receptacle to be wheeled in to pulping house, or may be carried in by the packers to the place of weighing. Such a tin, full length, holds, when full, 28 to 30 pounds of berries, according to the season. The berries are ready for picking when they assume a bright red or purple tint. Soon as the beans in the berry will move one upon the other when pressed firmly between the thumb and finger, picking may commence. The bright red berries are known by growers as "cherry," from their resemblance to that fruit.

This "cherry" skin or covering has to be removed by means of a machine of simple construction called a pulper. There are various contrivances used for the

purpose. A fairly effective method for small quantities is to pass the "cherry" between two wooden rollers geared together near enough to squeeze out the beans without crushing them. Under the rollers, place half a barrel nearly filled with water, place a sieve of half-inch mesh on a couple of laths resting on the edge of the tub or barrel. If water is fed with the cherry it helps the separation of the beans from the skins or "pulp." It will be needful to shake the sieve frequently. As all the beans may not have fallen through the mesh, throw the skins aside to be passed through water in another barrel. The beans will descend to the bottom by gravitation; the floating pulp may be thrown away. This method would never do where many hundredweights daily had to be worked, and is only mentioned for those with only a few trees, or for trial where there is no machine within reach. The two principal systems adopted are the disc and the breast-pulpers. The former is an iron disc revolving vertically. This disc is covered on one or both sides with copper, upon which are embossed rounded protuberances of various shapes; in some machines rounded, in others oval, and in still others, crescent-shaped. These elevations are close together and raised about one-eighth of an inch. The cherry is placed in a hopper from which it is guided by a cast-iron chop on one or both sides, placed near enough to the disc to crush the berries, but far enough off to allow the skin to pass between it and the chop. The cleaned-out beans escape in another direction. The "breast" pulper is a cylinder or drum 12 inches face and about the same in diameter. This drum is covered with copper, perforated something like an arrowroot grater, or with similar-shaped knobs to the disc pulper. The drum is mounted on a strong frame; in the front of it, and resting on the frame, to which it is fastened with bolts, is a bar of iron presenting a square face to the drum of about 1½ inches. The opposite side of the bar is chamfered away, leaving the thin edge on top. This thin edge is perfectly level and kept sharp. When pulping is proceeding, this lower chop is placed near the face of the drum, so close as to allow the skin to pass, only, say, not further away than one-sixteenth of an inch at most; generally a little less will do. If the distance between the chop and the cylinder is too great, the beans would be liable to be damaged. Above this chop is fastened a second chop, or "breast" bar, the lower edge of which is placed above three-eighths of an inch above the sharpened edge of the lower chop, its width is usually 4 or 4½ inches, the face against the drum, square, and closest at the lower edge, close enough to ensure the crushing of berries passing between it and the drum. A hopper is fixed above the drum, into which the "cherry" is placed. A chute is provided to convey the berries to the open space between the upper edge of the top chop and the drum; the latter, revolving, draws the berries downwards, the beans passing out from between the chops and the skin passing down behind the lower chop and along a chute to the back of the machine. The beans fall into a perforated sieve, the holes being large enough to pass the beans but to retain any unpulped beans and skin which must be returned to the hopper to go through the machine with fresh "cherry." For good, clean work, pulping should be done on the day of picking, or next day at latest. Water must also be freely used with the berries in pulping to facilitate the separation of the beans from the pulp, &c. Between the outer red skin and the inner "parchment" is a quantity of viscid matter which must now be got rid of, or the coffee would not dry properly. It would be sure to become mouldy and spoiled for sale. To remove the above viscid substance, the beans must pass through a fermenting process, which is accomplished in the following manner:—

The beans, fresh from the pulper, are placed in a receptacle such as a wooden tank, box, or barrel. After twenty-four hours or so, acetous fermentation should have converted the viscid substance into a vinegary sort of fluid, easily washed away from the coffee. The time needed for this change, however, will vary with temperatures. If the weather is cold, the writer has found the addition of a little warm water, and covering the vats with a few sacks, advantageous. To ascertain when the coffee is ready for washing out, dip out a quart or so from one of the vats and wash it well with clean water; if, after so washing, it is found to feel "gritty," having lost all feeling of slipperiness, it may be washed out. The cleansing should be continued till the water comes off quite clear. Remove all floating beans and skins, if any, by means of a skimmer, or they may be rushed over the end of the washing tank, or vat, into an empty vessel placed to receive them. After washing, the coffee must be placed in trays having bottoms of small-mesh woven galvanised wire, or perforated zinc, and sides of 3-inch wide pine battens. Stands for the trays may be made by driving stakes firmly into the ground at suitable distances apart, perfectly in line, and quite level, one with the other, on the tops. The lines should be in pairs, placed sufficiently far apart to carry the trays, allowing for 2 or 3 inches projection at each end of the trays for convenience of lifting. Nail a 3-inch batten to the stakes, edge up, along the top of any convenient length, say, 15 feet. This can be repeated, of course, to accommodate any number of trays. A shed or cover of some sort should be near the stands under which to place the coffee at night or in case of rain.

During the process of drying, the coffee should not lie deeper than 1 inch to 1½ inches on the trays; if there is no stint of the latter, and there is drying room enough, it would be better to spread the beans down to less than 1 inch in depth. To ascertain when the coffee is dry enough to be taken into the store, try a bean or two by pressure of the thumb nail, or between the front teeth. If either make an indentation, it is not quite ready for housing. After a little experience, the stage of dryness may be judged by the colour, which should be an even, slaty blue, but the thumb nail and teeth first, the other will come by practice. It sometimes happens, through unsuitable weather, and shortage of trays, that the coffee must be taken in. This may be safely done if the beans have shrunken from the parchment skin, and are spread thinly on the storeroom floor, and turned over daily till an opportunity offers of completing the drying in the sun.

It usually takes six or seven consecutive days of sunshine to thoroughly dry the coffee, during which time it must be frequently turned not less than three or four times daily. This ensures even drying, and will gain fully a day in the time of its exposure; it also secures other desirable ends.

The next and final stage in the preparation of the beans for the market is "hulling" or peeling—that is, the removing of the "parchment" and "silver" skins. This latter is a fine tissue lying between the parchment and the bean. There are several ways of accomplishing this removal of the covering of the beans. One way is to bruise or crush it off under a revolving roller fitted in a basin very similar to a mortar mill. Care is taken that the roller, or wheel, does not come into immediate contact with the bottom of the trough or basin. Another machine for the purpose, and the one in general use, is constructed much on the principle of an "Enterprise" meat mincer, a tapering spirally corrugated cone revolving in a similarly tapering and corrugated cylinder. The coffee is fed into this cylinder and forced forward to its smaller end. Much pressure and friction is exerted. A spring or weighted valve is fitted at the exit, through which the hulled and polished beans pass. A fan blows away the chaff. The beans are then passed through a grading machine fitted with a series of sieves. It is here graded into sizes, the pea-berry separated from the "flats" and any broken beans removed. This operation finished, the coffee is bagged, and is ready for market. Hulling, grading, and especially the difficulty of getting the coffee beans into a market where they could be placed before buyers of quantities, have acted as deterrents to the progress of coffee cultivation. These obstacles the Minister of Agriculture now proposes to remove if possible, by taking the coffee in the "parchment" stage from the grower, making a cash advance upon it; marketing the beans, and, after bare expenses are provided for, handing the difference between the sale price and the cash advanced to the grower.

In the foregoing pages it is not claimed that all is said about coffee-growing, &c., that can be said. The writer's aim has been to avoid redundancy of words and yet make plain as possible what was considered essential to assist and guide the would-be coffee-grower. Nothing has been put forward that has not been tested during nearly thirty years' experience in Queensland. Naturally, there will be differences in details in different localities—meteorological conditions, differences in quality of soil, situation of plantation, &c. But general principles of cultivation, &c., are the same pretty well all over this State.

It must also be borne in mind that what has been written has been intended for the small grower; hence no elaborate calculations as to the cost of establishing a big estate have been given. For one reason, it would not be advisable to open up extensively for coffee unless an adequate supply of suitable labour could be depended upon for picking. A small farmer could easily add 2 or 3 acres of coffee to his cultivation with the help of several juveniles for the harvesting only, and, as stated, it is with the especial object of assisting such men that this article has been penned. At the same time, anyone in a position to do so, and wishing to go into coffee-growing extensively, may depend upon the accuracy of its details, with the added value to Queenslanders that the information imparted has been accumulated in Queensland.

THE NORTHERN CANE FIELDS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from the Field Assistant, Mr. J. C. Murray:—

The following areas have been visited during November, 1920:—

PROSERPINE.

Taking this district right through, the cane is looking fairly well. The young plant cane is very healthy, and the majority of the growers are well satisfied with their prospects for next year. A good run has been experienced with the harvesting operations.

Of the varieties that are growing at Proserpine this year, Q. 813, Clark's Seedling, Badila, and 1900 Seedling appear to be making the most satisfactory progress. If the first-named cane continues as well as it has grown to the present, big crops ought to result from this variety. Badila, as is usual in the tropical areas, is doing well, free from disease, and showing that it is still remaining true to original type. The other two varieties, Clark's Seedling and 1900 Seedling, are not quite so satisfactory. There is evidence of disease in these canes that is not going to do them any good in the future. On close examination of the 1900 Seedling, two distinct types of leaf disorder were observed to be infecting the cane. The first appeared in the form of yellow stripes running longitudinally in the leaf, with green stripes running between them. Occasionally the entire leaf was white.

Other cane examined revealed, in the second place, a far more insidious form of disease than the chlorotic condition mentioned above. Upon close examination the leaves were observed to be spotted with irregular light-coloured patches on the leaves. The cane had a sickly appearance, with attentuated nodes and cracks on the internodes, longitudinally and diagonally. Small roots were shooting out at the nodes high up from the ground. The primary symptoms are similar to the striped leaf disease which usually affects B. 208, but which I have never previously observed in 1900 Seedling.

Great care should be taken by the growers who have cane attacked in this manner. No plants should be selected from affected areas, and growers who have clean plantations should carefully observe the behaviour of the cane and destroy any that show symptoms of this disease. It is very infectious, by working this way downward in the cane. Clark's Seedling is, in places, attacked in the same manner as 1900 Seedling, and similar precautions should be taken with this variety. There is no desire to infer, however, that disease is materially affecting the cane in the Proserpine areas; it is quite the contrary, but close examination will reveal the above condition in 1900 and Clark's Seedling. Proserpine looks very green at the present time. The roads are in good order, and the extension of the Silver Creek tramline is a source of satisfaction to growers, who hitherto had a long way to haul their cane on wagons. Every farmer is looking forward to greater prosperity next year, and the mill expects to be working at its utmost capacity.

HERBERT RIVER.

The farmers here are probably making the most whole-hearted attack on their farming problems at present that they have done at any time in their planting careers. The present season has been a good one and better things still are expected next year, when, judging by the areas planted, the mills should be taxed to their full capacity.

Cane pests are giving the grower in this district a fair amount of trouble, especially the borer and grub. The latter is at its worst in the vicinity of scrubs where the emergence is uninterrupted by ploughing, &c. If practicable, all these small patches of jungle close to farms should be cleared and some product grown in them. If the pest is sufficiently harassed during the pupating and developing period there is probably not such a large emergence as if left alone in scrub areas.

The principal varieties growing on the Herbert River are Badila and Clark's Seedling. There are a number of other canes growing, however, most of which are

distributed here and there on the farms in unimportant quantities. Careful selection of plants is very necessary on these areas. In view of the prevalence of borer and the incidence of gumming the growers cannot be too careful in getting the best and healthiest cane for their plants. With regard to gumming, the disease is fatal if not watched, and the bacteria which attack the vascular bundles of the plant work into the ground and keep attacking susceptible varieties, if care is not taken to select healthy cane of a variety that is, if not immune, highly resistant.

Of varieties that were not observed growing, Q. 813 and 855 should both do well on these areas. Soil conditions and methods of agriculture are the same as when last reporting on this place.

Very little labour trouble has been experienced during this year. Supplies of cowpea and mauritius bean seed are not yet available in suitable quantities for the farmers. Many of the growers are anxious to plant green crops, but are hampered with the difficulty of getting the seed. It would be highly beneficial to have plenty of vegetable matter in the soil, thus giving it greater powers of water conservation, and as much of the soil is poor in available plant food these green manures would largely help to restore deficiencies.

INNISFAIL.

Considerable rain fell during the time of visiting Innisfail, and consequently field work was interrupted. The growers have had a good run this season, the cane cut being of fair weight and sugar content, while the growing crop looks very fine indeed. The ratoon crop is very gratifying as well, particularly the Badila first ratoons. Clark's Seedling is covering a fair quantity of land, but does not promise as well as the first-named variety. Symptoms of leaf disease are apparent, and growers need to watch this variety carefully. It would be advisable here, if possible, not to ratoon this cane more than once, and carefully select plant cane for planting out. The introduction of D. 1135 from southern latitudes might be beneficial at Innisfail, say, for instance, a quantity of healthy plants from the Maroochy River. Q. 813 and 855 might also be profitably grown here.

Cane pests are not giving the growers much trouble. In the case of attack by grubs, arsenic might be used, but this nuisance is not present, at least this year, in sufficient numbers to cause alarm. Probably the large amount of ploughing and cultivating earlier in the season had something to do with this, having the effect of destroying habitation and interfering with the life cycle of the grub. Growers here, especially those operating at distances from the river, would be well advised to devote energy to planting green manure crops.

This area is probably the best cane district in Queensland, and the growers should in a few years be in a position to do more experimental agriculture. Farmers are using mechanical traction to a considerable extent around Innisfail, as well as other labour-saving devices.

SHEEP COUNTING.

A shepherd of the old school may be unable to count in the ordinary way, yet may keep a good reckoning by tallies, or by the old-fashioned sheep-counting scores. A flock tally is a short length of wood with notches representing twenties. Old-time sheep-counting scores exist in many forms in different parts, some of them going back 200 years, remnants of the ancient British scores. Here is a modern set detailed in the *Morning Post*, which still holds good with some of the older shepherds in Lincolnshire:—

1. Yan.	11. Yan-a-dik.
2. Tan.	12. Tan-a-dik.
3. Tethera	13. Tethera-dik.
4. Pethera.	14. Pethera-dik.
5. Pimp.	15. Bumpit.
6. Sethera.	16. Yan-a-bumpit.
7. Lethera.	17. Tan-a-bumpit.
8. Hovera.	18. Tethera-bumpit.
9. Covera.	19. Pethera-bumpit.
10. Dik.	20. Jiggit.

[This is apparently an old Welsh notation: the same words are used to the present day in Wales for the numbers up to 19; 20 was called "ikian" or "dikian." —Ed. Q.A.J.]

Botany.

THE PONGAMIA TREE (PONGAMIA GLABRA): A USEFUL FODDER TREE.

By C. T. WHITE, F.L.S., Government Botanist.

Description.—A small or medium-sized tree. Leaves imparri-pinnate, each leaf composed of 5-9 smooth, glossy, green leaflets; variable in size but averaging 2-3 inches long and 1-2 inches broad, elliptic lanceolate. Flowers in racemes in the leaf axils. Racemes 2-5 inches long, bearing 20-50 flowers; flowers pleasantly scented, 5-6 lines long on pedicels about 3 lines; calyx broadly cup-shaped, brown, clothed with short brown hairs, petals lilac-coloured. Pod 1¾-2 inches long, woody; seeds 1, rarely 2, brown, flat, somewhat kidney-shaped, about ¾ inch long.

The flowers are often galled by insect agency, producing round berry-like galls.

Distribution.—Widely distributed throughout tropical Asia, the Seychelles, Philippine Islands, Malay Archipelago, Polynesia, and tropical Australia.

Use as a Fodder.—Writing under date 9th June, 1920, Mr. N. A. R. Pollock, Northern Instructor in Agriculture, in forwarding specimens of Pongamia stated:—"The foliage of this tree in the drought of last year was found of great value as a fodder for cattle." This was very interesting to me, as the tree is known to possess poisonous properties, and I had not previously heard of its being used as a fodder. On looking the matter up, however, I found several references to the leaves as a fodder for cattle. J. Murray, in Watt's "Dictionary of the Economic Products of India," states:—"The leaves form a good fodder and are said to act as a lactogogue (milk-producer) on cows." R. H. Beddome in his "Flora Sylvatica for Southern India" states that "Cattle are very fond of the leaves," and J. F. Rock, in his recently published work "The Leguminous Plants of Hawaii," page 170, states that "The leaves of this species are a valuable fodder for live stock."

Other Uses.—The tree is one that is eminently adapted for street, esplanade, and general ornamental or shade purposes. Seeds germinate readily, and R. H. Beddome states that "Boughs stuck into the ground root readily, and grass and almost everything else grows well under its shade." The seeds are rich in oil, which is used by the natives of India as a lamp oil, also as a cure for skin diseases and rheumatism; and for many of the former, used as an external application, it is said to be very efficacious.

The wood is used in India and Malaya for a variety of purposes, but is said not to be very durable.

Poisonous Properties.—According to Roth (North Queensland Ethnography Bulletin, No. 3), the natives of certain parts of North Queensland used the roots for poisoning fish, the roots being roasted, beaten up on a stone, thrown into the water and left there all night. In experimental work by Harris and Smith (Memoirs of the Queensland Museum, vol. v., p. 13), the action of the root as a fish poison was found "to be rapid and effective, the leaves being only less potent than the roots." Apparently this poisonous property, whatever it is, does not affect the value of the tree as a fodder for live stock.

Botany of the Species.—The tree has received various names, the oldest botanical one apparently being *Cytisus pinnatus L.* (1753), for which reason Merrill (An Interpretation of Rumphius's Herbarium Amboinense, p. 271), has proposed the name *Pongamia pinnata.* It was named *Pongamia glabra* by Ventenat in 1803, and his name has been in such universal use since then that little good would seem to be effected by a change. Bentham (Flora Australiensis, vol. ii., p. 272), recognises a variety from several localities in North Queensland which he terms *var. minor* on account of the leaflets being small and narrow; it is very doubtful, however, how far varieties can be recognised in such a variable and widely distributed tree, and in the Queensland Herbarium we have the leaflets ranging from ½ inch broad (*var. minor*) to 4½ inches broad (exceptionally large).

PLATE 3.—THE PONGAMIA TREE (*Pongamia glabra*).

1. Leaf and flower-bearing shoot. 2. Pods. 3. Seed. 4. Round galls often found on the flowering branches. (All reduced to the same scale).

Entomology.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon Cane Grub Investigations from the Entomologist, Dr. F. J. Illingworth:—

Though the weather has been rather dry of late, the prospects remain excellent for the next season's crop. Light showers have helped out so that the young cane has not suffered so far, and there is now every prospect for continued rains. There has already been sufficient precipitation at Babinda to start the emergence of the beetles, and at the same time stimulate the growth of the crops. Consequently, all insect life is more in evidence in that humid belt than in the vicinity of our station.

As indicated in my August report, the Tachinid parasites (*Ceromasia sphenophori* Vill.) of the borer beetle were found fully established in the field where they were liberated last year at Moolaba. Just recently, however, investigation has shown that these valuable insects have spread most wonderfully, covering an area of approximately 50 square miles. In fact, they have spread to all of the farms lying south of the mill, extending 7 miles with nearly 6,000 acres of the best cane on virgin soil, much of it on the river flats, which produce exceedingly heavy crops.

BEETLE BORER PARASITES.

Through the cordial co-operation of Mr. A. L. McColl, manager of the Babinda Mill, I was able to make a comprehensive survey of the status of the Beetle Borer (*Rhabdoonemis obscura* Boisd.) in that district, at the end of October. I am also particularly indebted to Mr. George Robinson, the efficient assistant cane inspector, who took me on the rail motor to the most favourable locations for investigation, and gave me other valuable assistance. I was at once struck with the scarcity of borer injury in the whole district—the improvement over conditions prevailing last year was most marked. At the time that I liberated the flies at Rutherford's farm, 16th June, 1919, every stool appeared to be injured, and many of the stalks were totally ruined before they were sent to the mill. Now, however, there is hardly more than an average of 1 per cent. of the canes bored, as far as I was able to determine by an examination of the butts on the trucks. Undoubtedly the flies had a most excellent chance to become established in that location, for the cane was thoroughly infested, and stood for several months after the parasites were liberated. Then, too, there was young cane alongside infested with borers, which stood over until this season. A brief search revealed the parasites well established in this; we then proceeded to the farm of G. M. Reid, where we saw our parasitic flies sitting all over the trucks of green cane, sipping at the juice at the ends of the sticks; they had evidently just emerged that morning after the cane had been loaded. Passing on down the line to the south we came to a rake of trucks with burnt cane from the Bartle Frere Estate (W. Thiel's), and found the parasites also roosting on the sticks, feeding on the exuded juice. This was, indeed, surprising, for this cane was about 2½ miles from the place where the flies had been liberated. I was now anxious to know how widely the parasites had spread, so we continued across the Russell River and right down to the end of the line to Mr. S. H. Warner's farm, where, though the borers were very scarce, we found the parasites, which were evidently holding them well in check, fully 3½ miles from where the flies were first liberated. Returning, we stopped for a few minutes at the camp on the farm belonging to J. Maranoni, on the Queensland National Bank Estate, where I found a single stick showing borer signs. Cutting this open I located three grubs and each contained two maggot parasites—unmistakable evidence of their valuable work. On our way back to Babinda, about 3½ miles from Rutherford's, on the other side, I found the flies on trucks of green cane on a farm recently purchased by Mr. G. Cole from Mr. E. Otes. From the way that we found the newly-emerged flies sitting all over the trucks of cane in the field, and because the parasitised cane is often lost off during transit to the mill, I concluded that the flies would quickly spread to the area immediately surrounding the mill. This we have since been able to demonstrate. Mr. A. P. Dodd, Assistant Entomologist, and I have just concluded the survey, with results that are most gratifying—the parasites being established

everywhere that we looked for them. Hence we now know that they cover the whole area lying to the south of the mill, which furnishes the great bulk of the mill supply, *i.e.*, 6,000 out of the total of 7,000 acres.

Furthermore, it is gratifying to learn that the cane is cutting so much better than anticipated that the mill has recently had to revise its estimate, making an increase of 10,000 tons. Undoubtedly this advance is due largely to the activities of the Tachinid parasites in checking borer injury, hence the increased growth. As I have indicated in a previous report, the monetary value of these flies has been carefully determined in Hawaii, where it was found that they saved approximately a ton of sugar per acre the first year, with a further increase of 1¼ tons when they got fully to work, *i.e.*, £30 to £65 per acre as prices go here at present. Multiply this by the 6,000 acres benefited, remembering that the possibilities of spreading are practically unlimited. The outlook for the future is most encouraging, especially considering Australia's normal sugar shortage, since we find that the flies do so well, even in our wettest regions, where the beetle borer appears to be particularly destructive. And, moreover, true parasites, such as these Tachinids, can never become a pest, for the parasites can only develop in the larvæ of the host; once the host becomes scarce, the parasites are likewise reduced in numbers, until the balance of nature is finally reached, with just a few of the pests which inevitably escape, and a few parasites to search them out—neither greatly in evidence.

Regarding the question of the effect of burning the trash on these flies, let me say that I do not think that they will be seriously hindered by the fires. I have come to this conclusion from observations at Mossman, where, though all the cane is burnt every year before harvesting, the flies continue on duty wherever the beetle borers are in evidence. I still favour burning on all infested land, for it certainly destroys many pests in the fallen trash. Furthermore, infested fields are usually those rich in humus, so the trash is not so much required for fertility.

BEETLES EMERGING AT BABINDA.

Several light showers have started the emergence of beetles in this district. *Lepidiota caudata* Blkb., usually the earliest to come out, began to appear in numbers on 14th October, and fresh specimens continue to come to light (15th November). About 1st November I found a few *Lepidiota froggatti* Macl. and *Lepidiota albohirta* Waterh., both on feeding trees. At the same time various species of *Anoplognathus* began to appear, particularly *A. punctulatus* Oll. and *A. Smaragdinus* Ohaus, which swarmed in hordes over the wattles and other feeding trees. It is interesting to note that these beautiful green beetles remain on the trees during the day, where they continue to feed; and I have observed many mating pairs even at noon when the sun was very hot.

LINEAR BUGS.

For some reason this pest has considerably abated about the Mulgrave region, so I was interested to note that these bugs were present in great numbers in some sections of the Babinda area, particularly in those fields where there was abundant grass along the tramlines and in the headlands. In such fields I found young nymphs in all stages (10th October), especially on the ground at the roots of the grasses, and the leaves of the cane were covered with them on the undersides. In such cases it might be well to kill the grass with a spray of sodium arsenate, where there is no danger of stock getting at it. Treated thus it would be easy to burn within a few days, if it were possible to do so without destroying the cane.

CAMPSOMERIS WASPS.

I have called attention to the value of nectar-bearing plants in the vicinity of grubby areas, so that these wasps might be enticed and assisted in their destruction of the pests. While at Babinda I was interested to note the number of female wasps feeding on the flowers of a wild raspberry which grows abundantly by the roadsides adjoining cane areas there. Possibly the prevalence of these plants attracts so many of the wasps that they hold the grubs in check. At any rate, there has been no extensive injury from these pests in the Babinda area. The depth, too, at which these parasitic wasps go after grubs in the soil is most remarkable. Recently, at Greenhills, while excavating under stools of cane for the study of the grubs, we found two cocoons of the wasp at a depth of 42 inches, in soil so hard that we could barely chip it out with the spade. It is a known habit of this wasp to burrow with the grub, after she has paralysed it, as deeply as possible into the soil, so that her young will not dry out too much, *i.e.*, she tries to get down where the soil is permanently moist.

ARSENIC FOR GRUB CONTROL.

Recent experiments with this poison in the garden for the destruction of the grubs of *Isodon puncticollis* Macl. have proved its merits. In the preparation of hills for cucumbers, &c., as reported last month, I mixed fresh cow dung with the soil. Shortly after the plants began to spread, and before they even flowered, they became yellow and stopped growing, so that they quickly died out altogether. Investigation showed that the soil in these pits was simply alive with grubs of the above species in all stages; the beetles evidently were attracted in the first instance to the cow dung, and as the grubs increased in size they destroyed the young feeding roots of the plants. By dusting the cow dung with dry arsenic, using approximately the same amount that we have been applying to cane drills (80 lb. per acre), I prevented any grubs developing, though the adult beetles were found in this poisoned soil—evidently laying. Following this, I tried dusting the pits where the plants had died, mixing the poison with the soil, and left all the full-grown grubs (40 to 60 in each). Four days later I was unable to find any living grubs in these treated pits, though several living beetles still remained. These results are very encouraging, for evidently arsenic is quick death to these grubs, even when full-grown. And, furthermore, we have already demonstrated that the plants are not in any way injured by the application of this dry form of the poison to the soil. Since the *Isodon* grubs are very similar in habits of feeding to our regular cane grubs, these experiments lend further evidence to this important problem. Furthermore, our extensive experiments at Greenhills, where we have numerous plots to determine the value of poisons for the destruction of soil pests, are progressing favourably. Now that the rains have started the beetles will soon emerge; then, after two or three months we shall know the outcome, upon which our hopes are based.

GRASSHOPPER CONTROL IN NORTH QUEENSLAND.

By J. F. ILLINGWORTH.

Since grasshoppers are usually so well controlled by natural enemies in Australia, crops seldom suffer here to the extent that they do in less-favoured countries. In fact, these omnivorous feeders are capable of multiplying in such hordes, if not held in check, that they may devour every particle of verdure as they pass along through the country. This was the case in Kansas in 1874, the celebrated grasshopper year, when every crop was wiped out. In such instances it is no wonder that they are rated as the most destructive of insects.

Nevertheless, our parasites here, even the useful egg-parasites, normally so abundant, apparently are negligent at times for some unaccountable reason, and as a result so many of the hoppers hatch that they may become a scourge to our crops. For this reason our demonstration, by which we speedily checked this pest at Meringa recently, will prove of interest.

Early in June there was a primary outbreak which did some damage to sugar-cane; but since nothing was done to check the insects, many eggs were laid, which resulted in hordes of young hoppers appearing in September. The nymphs were so numerous that they covered the ground, and they gradually moved as an army through field after field of cane; their general path led westward, and wherever they camped to feed, the leaves were stripped to the midribs.

At the time that my attention was called to this latter swarm they had travelled about a mile, and men were in the act of trying to drive the full-grown nymphs out of the sugarcane into the dry grass, where they hoped to destroy them by fire. This proved of little avail, however, so I at once set about to destroy them with arsenic, for if they were permitted to reach the winged stage they would naturally fly widely and possibly become a serious menace.

CONTROL MEASURES.

In Kansas, where these pests make periodic appearances, the losses are often tremendous. Hence, experimentation has been carried out there on a large scale. A few years ago they developed a poisoned bait, which has proved most effective and is now generally used. This consists of—

Bran	20 lb.
White arsenic	1 lb.
Molasses	2 qts.
Lemons	3.
Water	3½ gals.

PLATE 4.—(FIG. 1) DESTRUCTION OF SUGAR-CANE BY GRASSHOPPERS.

Photo. taken shortly after they entered the field ; the young hoppers are to be seen on the leaves near the centre of the picture.

PLATE 5.—(FIG. 2) DESTRUCTION OF SUGAR-CANE BY GRASSHOPPERS.

A view showing the condition in which the field was left; the green leaves were eaten right down to the midribs. The leaves showing in the lower part of the picture were too dry for food.

The arsenic should be mixed with the bran dry; the lemons minced in a meat-grinder and added with the molasses and water, stirring so as to dampen the mash thoroughly. The attractiveness of the bait was found to be greatly increased by the oil from the rind of the lemons.

A year ago, grasshoppers again appeared in such numbers in Western Kansas that they threatened to wipe out all growing crops. Before control measures could be got under way they had destroyed vast quantities of nearly-ripe grain; in one county it was estimated that more than three million dollars' worth of wheat was destroyed. Rapid progress was made, however, in organising the thirty-nine counties affected; the total amount of bran mash distributed was 4,565 tons; this required 83 tons of white arsenic, 498,000 lemons, and 83,000 gallons of syrup. Thus, by an expenditure of a few thousand dollars, many millions of dollars' worth of crops were saved.

In using this mixture at Meringa it was prepared as above, and was sown broadcast very sparingly, so as to make it cover as much ground as possible. Then, too, by scattering the mash in the smallest possible particles it is not a menace to birds or poultry, for they could hardly pick up enough of the poison to injure them. Moreover, I found it best to scatter the bait in strips, about three or four rows apart, to conserve material. In the second lot that I made up I used double the quantity of lemons, since the bits of rind appeared to be much sought after by the young hoppers, and this fruit costs nothing here. The addition certainly appeared to increase its attractiveness.

About four hours after treatment I found many of the hoppers sick and crawling under the cane stools, where they appeared too weak to get away. Next day the dead hoppers were everywhere, especially under the stools and any trash that happened to be about. It was practically a clean sweep of both young and adults. I was surprised to find that the winged insects were so attracted to the bait, especially since there was plenty of standing cane with an abundance of green feed everywhere.

THE BEAN STEM WEEVIL.

A MINOR PEST OF BEANS.

The damage done to the french bean in our vegetable gardens demands some remedy which, as yet, has not been discovered in Queensland, so far as we know, unless we except the destruction of the plants by fire. Following is a very exhaustive paper on the subject, by R. W. Jack, F.E.S., Agricultural Entomologist, Department of Agriculture, Rhodesia, S.A.:—

"The insect to which the above title has been given is frequently responsible for destruction of small plantings of french beans in gardens, and is also an enemy of the cowpea or kaffir bean. It was identified as a pest from a garden near Old Umtali in 1913, and this appears to be the first record of its breeding habits, although the beetle itself had previously been described under the name of *Alcides leucogrammus*, Erich. Since that year it has appeared annually on the experimental plots at the Agricultural Laboratories, Salisbury, and has been observed on farms in different parts of Mashonaland.

"DESCRIPTION.

"The adult beetle, a female, is figured at six times its natural size at Fig. 4 on Plate 6. The actual length of the specimen including the 'beak' is about 10 m.m., or roughly thirteen thirty-seconds of an inch. The 'beak,' it may be mentioned, is in reality a prolongation of the head, and carries a set of jaws at the end, for, like all beetles, the Bean Stem Weevil is a biting insect. This prolongation of the head is characteristic of the family (Curculionidæ) to which the weevil belongs, and is the origin of the name 'Snout Beetles' frequently applied to members of the family. The 'beak' or snout varies greatly in shape and size with different genera, being sometimes short and as broad as it is long, and at others very long and slender, many varieties of intermediate forms also occurring. As the Bean Stem Weevil usually carries its head with the 'beak' pointing downwards in nature, it is more convenient to measure the insect in this position and leave out the length of the snout. The females are on the average larger than the males, the smallest male in the office collection measuring 6.5 m.m. and the largest female 8 m.m. (in both cases exclusive of the 'beak'). The coloration is black and cream in fresh specimens, but the latter colour darkens somewhat with age.

PLATE 6.—THE BEAN STEM WEEVIL.

"The whitish *larva or grub*, shown at Fig. 2 on Plate 6, is of the usual legless type of members of this family, the head being of a more or less brown ochre colour. There is little variation in the larvæ of allied species of this family, so further description is unnecessary. The *pupa* (chrysalis stage) is figured at Fig. 3 on the same plate and the egg at Fig. 1. All these figures are at the same magnification, namely, multiplied by six diameters, that is to say, six times as long and as broad as their actual size. The white shiny egg is thus a fraction over a millimetre (one twenty-fifth of an inch) in length.

"HABITS.

"The beetles feed mainly upon the stems and branches of the plants, in which they cut longitudinal grooves from which much frayed fibre projects. The eggs are laid in cavities at the base of the stems, the cavities being first prepared by means of the mouth-parts. Eggs timed in confinement hatched in about six days. The larva feeds on the tissues at the base of the stem, several commonly being found in one plant, and considerable swelling, often accompanied by formation of callus, results (see Plate 7). Where only one larva is present it is often entirely enclosed in the swollen stem and callus may not form to any great extent, but when, as is often the case, several are present, some are only partially buried in the stem, and much callus may be present. When full-grown the larva changes to the pupa stage within a tough oval cocoon, attached to or enclosed in the plant stem. The substance of the cocoon is mixed with fibres from the plant, and is more or less earth coloured. The adult beetle seems at times to remain in the cocoon for an indefinite period before making its way out to the light of day, but this is more noticeable in the later broods towards the end of the breeding season than when breeding is proceeding at its maximum rate. In the height of the summer the period of development from the deposition of the egg to the emergency of the adult may be as short as 50 days, but many specimens develop slowly and take much longer. In plants exposed for one week to the beetles for egg deposition half-grown larvæ were found at the time the first adults emerged.

"Breeding appears to be restricted to a short period of the year. The insect passes the winter as an adult, remaining buried in the ground during the colder months, but emerging to feed, if food is available, as the weather grows warmer. Egg laying has not been ascertained to take place earlier than late November, but except where the plants are watered or the soil is naturally moist, growing beans are not available under cultivation much earlier than this. Adult beetles have been seen in small numbers feeding on kaffir beans in a moist situation in mid-November, but no eggs or grubs could be found on the stems of the plants. This rather suggests that breeding even where conditions are favourable does not commence quite so early. Eggs laid in late November should produce adults from the middle of January onwards, and no beetles have been bred from infested plants earlier than this, although they have been found in the field in early January. The latter are judged to be specimens that have over-wintered, as the plot on which they were found was only planted on 26th November, and could not have been ready for egg laying until December. No earlier beans were in the vicinity. Over-wintering beetles have survived in the laboratory until late January, and then apparently escaped. Beetles bred out during January and February commence to lay after a few days, and this presumably constitutes the second brood, producing adults again during March and April. Beetles emerging in March and April have not laid eggs in the laboratory. It appears, therefore, that not more than two generations mature during the year, and that, owing to the longevity of the beetles, a considerable proportion of eggs laid by over-wintering beetles may produce beetles which live over the next dry season before commencing to lay, and under such circumstances, of course, only one generation occurs. Beetles were collected in small numbers, for instance, on cowpeas on 1st January, and the patch was apparently free from adults until late February and March, when considerable numbers appeared and were collected. These failed to lay in confinement, but lived on through the winter, whilst the January specimens laid freely under similar conditions during that month, adults of the next generation also appearing in late February and throughout March and early April.

"FOOD PLANTS AND DAMAGE.

"The Bean Stem Weevil, like the Bean Stem Maggot (*Agromyza sp.*) has only been found attacking beans of the genera Phaseolus and Vigna, that is to say, french beans and cowpeas. Velvet beans and other beans of different genera appear to be immune.

"A plant may apparently carry one grub without actually dying, but its growth and production are seriously interfered with. Many plants are killed outright and others become yellow and drop their leaves and die more slowly. Damage is sometimes overwhelming where a few rows are grown in kitchen gardens, but the weevil's capacity for increase does not seem sufficient to make it a serious field pest.

PLATE 7.—BEAN STEM WEEVIL.

"ENEMIES.

"No parasites have been bred from the grubs, but observations in the field have indicated considerable destruction by enemies, which eat into cocoons and devour the pupæ or resting adults, and probably also the larvæ. The driver ant *Dorylus helvolus* appears to be the chief enemy in this respect, as this species has been found on more than one occasion swarming in the empty cocoons and cavities of the stem weevil at the time the neighbouring plants contained larvæ. The wing covers and harder parts of the beetles have also frequently been found in cocoons, in which a small hole about one-twelfth of an inch in diameter had been eaten. This may have been the work of Dorylus or not, but no other enemy has actually been observed.

"CONTROL MEASURES.

"The insect is merely a minor pest of the kitchen garden, and no control measure is needed other than the removal and destruction by fire of infested plants, care being taken to remove the whole plant for this purpose. As a matter of practice all beans subject to attack should be pulled up and burned as soon as their period of usefulness is over, especially during the earlier part of the season.

"*Acknowledgment.*—Contributions to the life history of this insect, embodied in the foregoing account, were made by Mr. R. L. Thompson, late of this department.

"EXPLANATION OF PLATES.

Plate 6, Fig. 1. Egg of Bean Stem Weevil enlarged six times. The actual size of the egg is shown immediately above the enlarged figure.

Fig. 2 Larva approximately full-grown. Actual length indicated by hair line beneath.

Fig. 3. Pupa. Actual length indicated by hair line to left.

Fig. 4. Beetle or adult. Female. Actual length indicated by hair line to left.

Plate 7. Two cowpea stems injured by Bean Stem Weevil. The one on the left was attacked by several larvæ, and much callus has formed. The one on the right was attacked by one larva only, and its feeding chamber can be seen in the sectioned stem. From the outside the stem appears only slightly enlarged in the region of attack."

GLAZING A CEMENT BARREL.

The reply given in last month's Journal to our correspondent was intended for a barrel of wood. The same method, however, if applied several times, hot, should be successful with a barrel made of cement and sand, if applied several times hot, as it forms insoluble silicates which are practically indestructible. Twenty-four hours should be allowed between the application of each coat.

Another process may be tried, which is intended to make the inside of the barrel waterproof, and, at the same time, give it a slight glaze:—Mix ¾ lb. of castile soap with one gallon of water, and paint the inside of the barrel with the liquid while quite hot. Allow to stand for twenty-four hours. Then apply a coat of ½ lb. of alum dissolved in 4 gallons of water. After twenty-four hours, repeat the coats, until a chemical glaze is formed, which is said to be watertight for years. If it is found that salt affects the glaze, repeat the operation as often as necessary.

REVIEWS AND NOTICES OF BOOKS.

"An Authography of the Eucalyptus," by Russell Grimwade, B.Sc., Sydney, Angus and Robertson, 1920, is a most interesting description of many of the species of Eucalypti met with in Australia. There are about 250 described species of the genus Eucalyptus, of which the author has described and beautifully illustrated the leaves, flowers, and fruits. It would have added to the interest of the book if photographs of the bark characters had been included, as the bark, especially in Eucalypts, varies considerably. As an artistic work the book will doubtless be favourably received by those interested in forestry, and we here express our thanks to the author for his donation to our library.

General Notes.

PREVENTING THE INTRODUCTION OF COTTON PESTS INTO CALIFORNIA FROM MEXICO.

The "Monthly Bulletin of the Department of Agriculture, State of California," gives the following account of how the introduction of the Mexican pink bollworm and the Mexican cotton bollweevil by military manœuvres was prevented, by inducing the Mexican troops to recognise plant quarantine:—

"Early during the past summer rumours became current that a change of government was imminent in the Northern District of Lower California. Later on came the announcement on the part of the Cantu Government that it would resist, by force of arms, if necessary, any attempt of the *de facto* Government of Mexico City to instal a governor of its selection in the Northern District, and reports were received that an armed force of some three thousand men had left Mexico City to

PLATE 8.—In the lower left-hand corner, note the moth that produces the "Pink Bollworm of Cotton!"

invade the district and compel the surrender of the Cantu Government. Eventually the political differences between Governor Cantu and the Central Mexican Government were peacefully adjusted and the governor resigned in favour of the new appointee, Luis M. Salazar. Though the danger of armed conflict had passed, it became known that the *de facto* troops would nevertheless proceed to occupy the Northern District of Lower California. Considerable uneasiness was felt on the part of the cotton interests lest this army movement might be the means of introducing the pink bollworm or the Mexican cotton bollweevil into the cotton fields of Imperial valley, as it was known that the troops were coming from areas infested with either one or the other or sometimes both of these cotton pests. How well founded these fears were may be understood when it is explained that Mexican troops are usually accompanied by their wives and children and carry with them all sorts of luggage, including pillows and mattresses, which they frequently stuff with seed cotton, picked by the wayside when 'on the march.'

"As soon as it was learned that the troops, who were under the command of General Abelardo Rodriguez, had arrived in Sonora and were proceeding northward toward San Luis, from which point they would begin the last leg of their march to Lower California, the writer, through the courtesy of the Mexican Consuls at Calexico, California, and Yuma, Arizona, got in communication with General Rodriguez and arranged to meet him at San Luis, Sonora, for the purpose of an interview. In this interview, which took place at San Luis, Sonora, on Friday, 27th August, it was explained to the general that the port of Calexico, California, had been maintained open for the importation of cotton grown in Imperial Valley, Lower California, Mexico, largely because of the geographic isolation of the Northern District of Lower California and the consequent meagre traffic between the Northern District and the main portion of Mexico, which eliminated to a great extent the danger of introducing such cotton pests as the bollweevil and the pink bollworm; that there was grave danger of carrying these cotton pests into Lower California if his army proceeded without his taking the precaution to leave behind all materials which might carry the larva, adults, or eggs of these insects. The general replied, in substance, that the troops were to be newly clothed with new blue denim overalls, given new blankets, underclothing, and, in fact, newly clothed throughout with clothing which had been ordered from Los Angeles, California; that inasmuch as the old uniforms and clothing, then being worn by the soldiers, were badly worn, and practically useless for further service, from a military standpoint, it would occasion no great loss if the entire outfit to be discarded were burned there in the desert where the troops were then camped. This the general promised to have done. It was learned further, from the visit to the camp, that, contrary to custom, these troops had not brought with them their wives and families, which, of course, simplified the problem considerably.

"The troops arrived in Mexicali, capital of the Northern District of Lower California, opposite Calexico, California, on the morning of the first day of September, clad in new blue denim overalls, and otherwise newly clothed, carrying only their guns and rations, and a cotton blanket apiece. Later on, General Rodriguez informed the writer that, as an extra precaution, he had ordered to Ensenada and Tijuana, on the Pacific Coast, the only regiment that had recently seen service in the cotton-growing districts of Mexico. Thus passed, as it is confidently believed, the danger of the introduction of cotton pests into Imperial Valley through the invasion of the troops of the *de facto* Government of Mexico City. The present Government of the district states that the troops which recently arrived will be assigned to permanent duty in the Northern District, and so remove the need of further troop movements into the Imperial Valley cotton-growing area and the consequent endangering of the cotton industry."

CURING HIDES.

Frequently we are asked for a method of curing hides for home use. The following, which is taken from the Fijian "Agricultural Gazette," should prove useful; it was prepared by the Government Veterinary Officer:—

1. Immediately after skinning, the hide should be placed stretched out hair-side downwards under cover or protection from sun and rain.

2. Ten pounds or more of salt must be used for each hide, well rubbed in and well sprinkled over it.

3. In addition to the above, the hide should be well sprinkled with either (*a*) ½ lb. of boracic acid or (*b*) ½ per cent. solution of arsenite of soda.

4. The hide should be left for fourteen days, when it may be rolled up for export.

The boracic acid has the advantage of keeping the hide soft, thus facilitating the operating of rolling it into a bundle. Arsenite of soda may be purchased in the form of a commercial arsenical cattle dip. It may also be made by boiling together 1 lb. of white arsenic and 2 lb. of washing soda in 1 gallon of water until all is dissolved. With ordinary commercial white arsenic this solution so obtained may be taken roughly as 10 per cent. strength. For use it should be diluted 1 in 20.—"Farmers' Gazette."

CARROTS FORKING.

The land on which it is intended to raise a crop of carrots should be a rich, sandy soil which has been heavily manured for a previous crop. Soil treated with rank, new manure will not grow good carrots, as they invariably grow coarse and flavourless if the manure is too new. Therefore, if the soil requires enriching have the manure applied some time previous to sowing the seed, and in order to prevent "forking" it ought also to be ploughed or dug deeply, thus enabling the roots to grow long and straight. If the ground is hard underneath growth may take place from the sides of the roots instead of continuing straight downwards, and "forking" is inevitable. The best time to sow carrots is in March or April, and with a little care they may be grown all the year round. The same treatment is applicable to parsnips. Before sowing the seed of either of these vegetables, the soil should be made as fine as possible, and the drills should not be more than 1 inch deep.

FOR PUBLIC INFORMATION.

THE COMMONWEALTH BANK OF AUSTRALIA AND THE QUEENSLAND GOVERNMENT SAVINGS BANK.

Attention is drawn to the fact that the Agreement between the Commonwealth Bank of Australia and the Government of the State of Queensland, providing for the transfer of the said Bank of the Queensland Government Savings Bank business, has been ratified by Parliament, and from 6th December, 1920, the combined Savings Bank business will be carried on by the Commonwealth Bank of Australia.

It is the intention of the Commonwealth Bank to conduct at an early date general banking in addition to Savings Bank business at all the late branches of the Queensland Government Savings Bank, and also to establish Savings Bank centres at other points to facilitate the handling of the business.

OF INTEREST TO RUBBER PLANTERS.

WHAT EVERY PLANTER OUGHT TO KNOW.

BY FRED KNOCKER, F.Z.S.

(Author of *Hevea Braziliensis* in British Malaya).

From "The Planters' Chronicle," Madras.

A SIMPLE LESSON ON THE PHYSIOLOGY OF HEVEA BRAZILIENSIS.

I am not going to preach a sermon, but I should like to take for a text the 2nd and 3rd paragraphs of the 51st page of the first number of "The Planter": "Bark Renewal"—"The Origin of Latex." Assuming you have read and marked the substance of this text, we will now proceed to learn it, subsequently leaving it to the reader's discretion to inwardly digest it. It will be a long, circuitous route, and for the planter bereft entirely of any knowledge of plant physiology it may become tedious. Howbeit, the author promises faithfully, on the one part, not to inflict upon his readers anything beyond the simplest of scientific nomenclature, nor puzzle them with abstruse phraseology, so that the veriest tyro may safely venture on the journey. If, on the other part, the reader follows the author closely, even the wisest of you may lay down the paper eventually with a feeling of having been mildly interested, whilst the untutored may become imbued with a sense of self-satisfaction at having mastered a very simple elementary lesson in physiological botany.

The life of the rubber planter is thwart with averages; so I may be forgiven if I start right off by saying that the average rubber planter's knowledge of the anatomy of the tree he has to deal with is confined to wood, bark, and cambium. Over and beyond these he has some vague idea of a current of water passing up and down the tree and called the sap. When the bark is cut by the tapping coolie the average planter is ocularly convinced that a white, milky fluid is contained somewhere in the bark, and that fluid he has been taught to call latex. I have occasionally met planters who have actually wondered how this latex gets there, and what it is for; but the planter who expresses any innate inquisitiveness as to how the bark, once destroyed, gets renewed belongs to a class above the average and might be honestly termed a

rara avis! If you ask our friend the average planter how it comes about he dismisses the subject airily with: "Oh! the cambium does all that sort of thing"—just as we might reply to the question, where the water in the bath jar comes from every day—"Oh! the *tukang ayer* sees to that!"

However, here we have at least a workable basis on which to start our lesson: the wood, the bark, the cambium, the sap, and the latex. To get a fair grip of the subject our preconceived idea of the wood forming one substance in the centre of the tree has to be amplified; whilst what we know of the bark has to be completely revolutionised. These two points and the mystery of the cambium cleared up, then the true meaning of the simple words sap and latex will follow automatically.

The real centre of any tree is not the wood at all: it is the *pith* or *medulla*. To the rubber planter, however, it is of no consequence. Indeed, it is of very little consequence to the tree itself—so little consequence, in fact, that in some trees it is entirely missing. In other words, it takes no part at all in the life system of the tree. Now the wood itself does; and in order to do so it is divided by nature into two parts. There is the old wood, naturally the inner portion and increasing in hardness towards the centre ring, the degree of hardness varying in different species of trees, as, indeed, is well known. Then there is the young, outside wood, soft and moist. This is called the *sap-wood* or *alburnum*, as distinct from the *heart-wood* or *duramen* of the old wood. The two together are known as the *xylem*. Of these names the reader can please himself which he uses in future, but for the purposes of this article I shall prefer the more simple, homely-sounding ones. So, the heart-wood's function in the life of the tree is to merely support the stem; but that of the sap-wood is far more important, containing as it does vessels acting as air-carriers and fibres through which the sap passes up the tree—hence the title sap-wood.

That is, roughly, the physiological significance of the word "wood" or "xylem." But before carrying on with our other household words it would be as well to break off here and go right into this business of the sap, a full understanding of which is positively necessary for the exposition of our text.

It has been pointed out that the sap passed upwards through the fibres of the sap-wood—a simple statement on a par with the one anent the cambium and bark renewal! Nevertheless, there must be some force, or forces, at work to induce any liquid to flow upwards in a vertical direction. This opens up a wide field of controversy and well known botanical facts. The former need not concern the practical planter, excepting, if so he chooses, as a hobby. Of the latter the one outstanding feature is the natural phenomenon known as *transpiration*, and that does concern every practical rubber planter very considerably. Speaking broadly, a knowledge of other causes of sap movement are immaterial to the rubber planter from a practical, or utility, standpoint. It engenders a far more intimate knowledge of cellular formation and plant histology than is compatible to a magazine article. Yet a generalised understanding of this process of transpiration cannot be otherwise than helpful to the young rubber planter; and, were it not for the lamentable fact that a generation of rubber planters has passed away in abject ignorance of the knowledge, I should say it was indispensable.

To gain a clear impression of plant transpiration and all its import we must transfer our attention, for the time being, from the stem of the tree to its leaves. I suppose we are all alive to the tremendous importance of a profuse and richly hued foliage to *Hevea braziliensis*. Upon it depends all that goes to the making of the rubber planter's fortune. In spite of which, how many of us can answer that little question, "Why?" It is a complicated subject, but withal capable of being treated broadly so that we may yet be able to give an intelligent reply to the interrogation in the short space of this lesson.

[TO BE CONTINUED.]

Answers to Correspondents.

FLOWER GARDENING.

"AMATEUR FLORIST," Redcliffe.—

The publication on this subject issued for some time by the Department of Agriculture and Stock is now out of print, and the work cannot consequently be supplied to you.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR DECEMBER, 1920.

Article.		DECEMBER. Prices.
Bacon	lb.	1s. 5d.
Barley	bush.	5s. 5d.
Bran	ton	£9 5s.
Broom Millet	„	£30 to £35
Broom Millet (Sydney)	„	£24 to £45
Butter (First Grade)	cwt.	238s.
Chaff, Lucerne	ton	£5 10s. to £8 5s.
Chaff, Mixed	„	£6 to £6 10s.
Chaff, Oaten (Imported)	„	£7 5s. to £9
Chaff, Oaten (Local)	„	£7 6s. to £7 10s.
Chaff, Wheaten	„	£7 16s.
Chaff, Panicum	„	...
Cheese	lb.	1s. 2d.
Flour	ton	£19 10s.
Hams	lb.	1s. 8d. to 1s. 11d.
Hay, Lucerne	ton	£5 10s to £5 15s.
Hay, Oaten	„	...
Honey	lb.	6d. to 7d.
Maize	bush.	4s. 4d. to 5s. 8d.
Oats	„	2s. 6d.
Onions	ton	£7 to £8 10s.
Peanuts	lb.	7d. to 9d.
Pollard	ton	£9 15s.
Potatoes (English)	„	£4 to £7
Potatoes (Sweet)	cwt.	2s. to 2s. 6d.
Pumpkins (Cattle)	ton	£2 to £5
Eggs	doz.	1s. 4d. to 1s. 6d.
Fowls	per pair	7s. to 10s.
Ducks, English	„	5s. to 6s.
Ducks, Muscovy	„	10s. to 11s.
Geese	„	10s. to 11s.
Turkeys (Hens)	„	10s. to 13s
Turkeys (Gobblers)	„	28s. to 36s.
Wheat (Chick)	bush.	7s. 7d.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per dozen bundles	12s. to 18s.
Beans (French), per sugar bag	2s. to 8s. 6d.
Beetroot, per dozen bundles	6d. to 1s.
Cabbages, per dozen	1s. to 6s. 6d.
Carrots, per dozen bunches	1s. to 2s.
Cucumbers, per dozen	3d. to 6d.
Lettuce, per dozen	1s.
Marrows, per dozen	1s. to 3s.
Peas, per sugar bag	3s. to 9s.
Potatoes (Sweet), per cwt.	2s. to 2s. 6d.
Pumpkins (table), per dozen	2s. 6d. to 5s.
Rhubarb, per bundle	9d. to 1s. 3d.
Tomatoes (prime), per quarter case	7s. to 9s.
Tomatoes (inferior), per quarter case	1s. to 2s.
Turnips (Swede), per cwt.	1s. 3d. to 1s. 6d.

SOUTHERN FRUIT MARKETS.

Article.	DECEMBER. Prices.
Bananas (Tweed River), per double case	20s. to 23s.
Bananas (Queensland), per double case	20s. to 24s.
Bananas (Fiji), per double case	...
Cape Gooseberries, per case	6s. to 12s.
Lemons, per bushel case	12s. to 14s.
Mandarins, per case	4s. to 6s.
Oranges (common), per bushel case	10s. to 12s.
Oranges (Navel), per bushel case	16s. to 18s.
Passion Fruit, per half bushel case	3s. to 12s.
Pineapples (Queensland), per double case	20s. to 25s.
Pineapples (Ripley), per double case	10s. to 14s.
Pineapples (common), per double case	10s. to 14s.
Tomatoes (Queensland), per quarter case	12s. to 20s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per bushel case	18s. to 19s.
Apples, Cooking, per bushel case	10s. 6d. to 15s. 6d.
Apricots, per half bushel case	4s. to 9s.
Bananas (Cavendish), per dozen	2d. to 7d.
Bananas (Sugar), per dozen	1d. to 4d.
*Bananas (Lady's Finger), first quality, per dozen	1s. 5½d.
Bananas (Lady's Finger), second quality, per dozen	8¾d.
Bananas (Lady's Finger), third quality, per dozen	4¼d.
Cherries, per tray	6s. to 10s.
Citrons, per cwt.	16s.
Cocoanuts, per sack	£1 5s.
Cape Gooseberries, per quarter bushel case	2s. to 5s.
Lemons (Lisbon), per quarter case	4s. 6d. to 6s. 6d.
Mandarins, per case	3s. 6d. to 6s.
Mangoes (Northern), per bushel case	6s. 6d. to 10s. 6d.
Oranges (Navel), per case	5s. to 9s.
Oranges (other), per case	1s. 6d. to 2s. 6d.
Papaw Apples, per tray	2s. to 4s.
Passion Fruit, per quarter case	4s. 6d. to 7s. 6d.
Peaches, per quarter case	1s. 6d. to 4s.
Pineapples (smooth), per case	7s. 6d. to 10s.
Pineapples (rough), per case	9s. to 10s.
Strawberries, per dozen boxes	10s. to 20s.
Plums, per case	3s. 6d. to 6s.
Rockmelons per dozen	1s. to 6s. 6d.
Tomatoes, per quarter case	2s. to 3s.
Water-melons per dozen	3s. to 17s. 6d.

* On 2nd December a record price was obtained for Lady's Finger Bananas.

TOP PRICES, ENOGGERA YARDS, NOVEMBER, 1920.

Animal.	NOVEMBER. Prices.
Bullocks	£18 15s. to £21
Cows	£16 to £19 12s. 6d.
Merino Wethers	34s.
Crossbred Wethers	35s. 9d.
Merino Ewes	30s.
Crossbred Ewes	32s. 3d.
Lambs	33s.
Pigs (Porkers)	71s.

Farm and Garden Notes for February.

FIELD.—The land intended for potatoes should now be ready for planting. Plant sound small potatoes, well shot, without cutting them. If large potatoes are cut into setts, there is a risk of their rotting, as the usual wet weather may be expected, with a hot, muggy atmosphere. Weeds will be very troublesome, and for that reason the sowing of lucerne should be deferred till later. Sow lucerne in deep rich soil, thoroughly worked and deeply ploughed. Cape barley, panicum, kaffir corn, imphee, sorghum, and vetches may be sown; but it is risky to plant maize for a late crop, as early frosts would destroy the ripening grain. For an early winter crop, sow swede turnips and mangel wurtzels. Pick cotton as the bolls burst. Do not pick until the dew has dried off the bolls. Expose the picked cotton for a couple of hours to sun heat.

KITCHEN GARDEN.—Make preparations for good crops of vegetables for the early winter by ploughing or digging all unoccupied land, supplying well-rotted manure if needed. Chicken guano is also an excellent fertiliser, if prepared as follows:—

Spread a layer of black soil on the ground. Dump the fowl manure on to this, and pound it fine with the back of a spade; add hardwood ashes, so that the compound shall contain—Soil, 3 bushels; fowl manure, 2 bushels; ashes, 1 bushel. Mix thoroughly, and a little before planting moisten the heap with water, or, better still, with urine; cover with old mats, and let it lie till needed.

Most market gardeners will have cabbages and cauliflowers ready for transplanting. Do this during the month. In the pamphlet on "Market Gardening" issued by the Department, it is recommended to sow the seed from the middle of January to the middle of March, arranging the time, however, to suit early and late districts. For winter crops, the Drumhead type, of which Flat Dutch and Queensland or Florida Headen are good examples, are the most profitable. The Savoy cabbage does well here. The best cauliflowers to grow are the Large Asiatic, Eclipse, Early Dwarf, and Le Normand. If the aphis appears, spray with tobacco solution.

Sow french beans, butter beans, beet, carrot, turnip, radish, cabbage, cauliflower, cress, peas. Should the weather prove dry after the January rains, give the plants a good soaking with water. Gather all fruit of cucumbers, melons, french and other beans, and tomatoes as they ripen, to ensure the continued production of the vines and plants.

FLOWER GARDEN.—Thin out and tie up dahlias. Keep the weeds down, and never allow them to seed. Sow hardy annuals. This is the best month for sowing, as you will be able to keep up a succession of bloom during the succeeding months, of autumn and winter. To ensure this, sow phlox, pansy, daisy, stocks, aster, nasturtium, hollyhock, candytuft, mignonette, sweet peas, dianthus, carnations, cornflower, summer chrysanthemum, verbenas, petunias, pentstamons, &c. Dianthus, sown now and planted out in March, will bloom during the whole year, if the dead stalks and blooms are regularly cut away.

Do not sow flower seeds too deep, as on the depth will depend greatly what results you will have as regards the seed germinating. It is easy to remember that seeds should be covered with fine soil to a depth equal to their own size; for instance, a pea is about one-eighth of an inch in diameter, therefore, cover it with one-eighth of an inch of soil.

Orchard Notes for February.

In order that the series of monthly notes that have appeared for some years past in the "Agricultural Journal" might be rendered of more value to our fruit-growers, advantage was taken of the commencement of the new year to revise them and bring them up to date. At the same time, the notes have been somewhat altered, as, instead of making them of a general nature, applicable to the whole of the State, they are, to a certain extent, localised, as, although the general principles of cultivation, manuring, pruning, treatment of fruit pests, as well as of the handling and marketing of the fruit, are applicable to the State as a whole, there are many matters that are of interest to individual parts of the State rather than to the whole State; and, further, notes that are applicable to the Southern part of the State for one month are not always applicable to the North for the same month.

In order to carry out this idea the State has been divided as follows:—

1. The Southern Coast Districts, south of the Tropic of Capricorn;
2. The Tropical Coast Districts;
3. The Southern and Central Tablelands.

This plan has met with such general approval during the past year that the notes will henceforth be published in accordance therewith.

THE SOUTHERN COAST DISTRICTS.

The earlier summer fruits, including grapes, will be pretty well over, but pineapples, mangoes, and bananas are in full fruit. The bulk of the main summer crop of pines ripens during the month, and growers are in consequence kept very busy sending them to both our local markets and canneries, and to the Southern States. The planting of all kinds of tropical fruits can be continued where necessary, though earlier planting of both pines and bananas is to be recommended. Still, if the land is thoroughly prepared—viz., well and deeply-worked—they can be planted with safety, and will become well established before winter. The month is usually a wet one, and both tree and weed growth is excessive. If unable to get on the land with horses to keep down weed growth, use the scythe freely in the orchard before weeds seed, as by doing so you will form a good mulch that will tend to prevent the soil washing, and that when ploughed in later on will add a considerable quantity of organic matter to the soil, thus tending to improve its mechanical condition, its power of absorbing and retaining moisture, as well as to increase its nitrogen contents.

This is the best month of the year in which to bud mangoes in the Brisbane district. The bark of the stock to be budded must run very freely, and the scion, when placed in position, must be tied very firmly. The bark of the scion should be slightly thicker than the bark of the stock, so that the material used to tie it keeps it firmly in its place. As soon as the bud is tied, ringbark the stock just above the bud, so as to force the sap of the stock into scion, so that a union will take place quickly.

Where cyaniding of citrus and other trees has not been concluded it may be continued during the month, as fruit treated now will probably keep clean and free from scale insects till gathered. If the trees have been treated with Bordeaux mixture, do not cyanide, as cyaniding should always be done previous to spraying with Bordeaux mixture.

If Maori is showing, spray with the sulphide of soda wash. Look out for Black Brand and also for the Yellow Peach Moth towards the end of the month in the earlier districts. Spraying with Bordeaux mixture is advisable in the case of both of these pests.

Get land ready for strawberry planting, so as to be ready to set out runners next month. Some growers set out plants as early as the end of February, but March is to be preferred. Citrus and deciduous trees can still be budded during the month. Young trees in nursery should be kept clean and attended to; ties should be cut where necessary, and the young trees trained to a straight single stem.

THE TROPICAL COAST DISTRICTS.

As the month is usually a very wet one in this part of the State, very little work can be done in the orchard other than keeping down excessive weed growth by means of a scythe. When citrus trees are making excessive growth and throwing out large numbers of water-shoots, the latter should be cut away, otherwise they are apt to rob the rest of the tree, and thus injure it considerably. Many of the citrus trees will come into a second blossoming during the month, and this will produce a crop of fruit ripening towards the end of winter and during the following spring. The main crop, where same has set in spring, will be ripening towards the end of the month, but as a rule insect life of all kinds is so prevalent at this time of year that the bulk of the fruit is destroyed. Where there is sound fruit, however, it will pay to look after. If the weather is wet it should be artificially dried before packing; but if there are periods of sunshine, then the fruit can be cut and laid out on boards or slabs in the sun, so that the extra moisture of the skin can be dried out. Care will have to be taken not to sun-scald the fruit, or to dry it too much; all that is required is to evaporate the surplus moisture from the skin, so that the fruit will not speck when packed.

Tropical fruits of all sorts can be planted during the month. Budding of mangoes and other fruits can be continued. Bananas must be kept netted, as fly is always bad at this time of year.

THE SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of apples, pears, plums, peaches, and nectarines will occupy the attention of the Stanthorpe growers. The grape harvest will also extend right through the month. Every care should be taken to see that the fruit fly and codling moth are not allowed to spread, although the best work in fighting these pests has to be done during the months of December and January, as on the action then taken, if carried out systematically, the freedom of the later fruits from infestation mainly depends.

Handle the fruit carefully, and see that no fly or codling moth infested fruit leaves the district. The grapes, ripening as they do when this fruit is over in the earlier parts of the State, should be sent not only to Brisbane, but to all other parts of the State. For long shipment nothing can beat crates holding 6-lb baskets. The fruit should be gathered some hours before packing, and be placed in the sun, so as to become thoroughly dry, and to allow the stems to become wilted, as this causes the fruit to hang on the bunch much better, and consequently to reach its destination in better order.

If parrots and flying foxes are troublesome, organised shooting parties or poisoning with strychnine are the best means of dealing with those pests.

The crop of grapes will be about over in the Roma and other inland districts. Citrus trees, when infested by Red Scale, should be cyanided. The orchard should be kept well cultivated after every rain, and when there is no rain, but water is available for irrigation, if the soil requires it, the trees should get a good soaking, which, if followed by thorough cultivation, will carry the trees on till the fruit is ripe.

GRAFTING THE PAPAW.

The young seedlings may be grafted after being planted out in their permanent positions. The trees from which scions are taken should be such as produce the largest fruits of good quality and the heaviest crops.

TO REMOVE WARTS.

A correspondent of "Hoard's Dairyman" gives the following method of removing warts from cows' teats, which he states he has used for many years with complete success:—"Just apply oil of cinnamon to the warts twice a day for a few days and watch them shrivel up and disappear. Sometimes a long one will harden and hang for some time, but they can be twisted out. Apply with a feather, and get as little on the teat as possible, as it sometimes makes the skin sore. If there are many warts, treat a few at a time, or wait until the cow is dry and clean them off before she is fresh."—"Queensland Grazier."

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.
AT BRISBANE.

1921.	JANUARY.		FEBRUARY.		MARCH.		APRIL.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·57	6·45	5·22	6·42	5·41	6·20	5·58	5·46
2	4·58	6·45	5·22	6·41	5·41	6·19	5·58	5·45
3	4·59	6·45	5·23	6·41	5·42	6·18	5·59	5·44
4	4·59	6·46	5·24	6·40	5·43	6·17	5·59	5·43
5	5·0	6·46	5·24	6·40	5·43	6·16	6·0	5·42
6	5·1	6·46	5·25	6·39	5·44	6·15	6·0	5·41
7	5·2	6·47	5·26	6·38	5·45	6·14	6·1	5·40
8	5·2	6·47	5·27	6·38	5·45	6·13	6·1	5·39
9	5·3	6·47	5·27	6·37	5·46	6·12	6·2	5·38
10	5·4	6·47	5·28	6·36	5·46	6·10	6·2	5·37
11	5·5	6·47	5·29	6·36	5·47	6·9	6·3	5·35
12	5·5	6·47	5·30	6·35	5·47	6·8	6·3	5·34
13	5·6	6·47	5·30	6·34	5·48	6·7	6·4	5·33
14	5·7	6·47	5·31	6·33	5·48	6·6	6·4	5·32
15	5·8	6·47	5·32	6·33	5·49	6·5	6·5	5·31
16	5·9	6·47	5·32	6·32	5·49	6·4	6·5	5·30
17	5·9	6·47	5·33	6·31	5·50	6·3	6·6	5·30
18	5·10	6·47	5·34	6·30	5·50	6·2	6·6	5·29
19	5·11	6·47	5·34	6·30	5·51	6·1	6·7	5·28
20	5·12	6·46	5·35	6·29	5·51	6·0	6·7	5·27
21	5·12	6·46	5·36	6·28	5·52	5·59	6·8	5·26
22	5·13	6·46	5·36	6·27	5·52	5·58	6·8	5·25
23	5·14	6·45	5·37	6·26	5·53	5·57	6·9	5·24
24	5·15	6·45	5·38	6·25	5·53	5·56	6·9	5·23
25	5·15	6·45	5·38	6·24	5·54	5·55	6·10	5·22
26	5·16	6·44	5·39	6·23	5·54	5·53	6·10	5·21
27	5·17	6·44	5·40	6·22	5·55	5·52	6·11	5·20
28	5·18	6·44	5·40	6·21	5·55	5·51	6·11	5·20
29	5·19	6·43	...	...	5·56	5·50	6·12	5·19
30	5·20	6·43	...	...	5·56	5·49	6·12	5·18
31	5·21	6·43	...	...	5·57	5·48	...	...

PHASES OF THE MOON, ECLIPSES, &c.

(The times stated are for Queensland, New South Wales, and Victoria, where the clock time is identical).

			H.	M.	
9 Jan.	●	New Moon	3	27	p.m.
17 „	☾	First Quarter	4	31	p.m.
24 „	○	Full Moon	9	8	a.m.
31 „	☽	Last Quarter	6	2	a.m.

Apogee on 9th. Perigee on 23rd.

8 Feb.	●	New Moon	10	37	p.m.
16 „	☾	First Quarter	4	53	a.m.
22 „	○	Full Moon	7	33	p.m.

Apogee on 5th. Perigee on 21st.

1 Mar.	☽	Last Quarter	abt. m'night		
10 „	●	New Moon	4	9	a.m.
17 „	☾	First Quarter	1	49	p.m.
24 „	○	Full Moon	6	19	a.m.
31 „	☽	Last Quarter	7	13	p.m.

Apogee on 5th. Perigee 21st.

8 Apr.	●	New Moon	7	5	p.m.
15 „	☾	First Quarter	8	12	p.m.
22 „	○	Full Moon	5	50	p.m.
30 „	☽	Last Quarter	2	9	p.m.

Apogee on 2nd and 30th. Perigee on 17th at 3 p.m.

ECLIPSES.

An Annular Eclipse of the Sun visible in North of Scotland but not in Australia will occur on April 8th.

An Eclipse of the Moon will occur on April 22nd, when the Moon will rise totally eclipsed.

The Planets Venus, Mars, and Uranus will be remarkably close together apparently on January 9th, and will form a fine celestial picture with the Moon on the 13th.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise about 4 minutes later than at Brisbane if it were not for its higher elevation, and at Oontoo (longitude 141 degrees E.) about 48 minutes later.

At St. George, Cunnamulla, and Thargomindah the times of sunrise and sunset will be about 18 m., 30 m., and 38 minutes respectively, later than at Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.